

TEXTBOOK OF CHIROPODY

by

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WITH 105 ILLUSTRATIONS

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PREFACE

FOR many years there has been need for a comprehensive textbook of chiropody—comprehensive in that whilst dealing in detail with pure chiropody it should also indicate those points in medical and surgical conditions which may complicate a very minor chiropodial condition. It is the object of the present book to meet that need.

It is no part of my intention to write a medical or surgical textbook but merely to send chiropody students back to such textbooks and to warn them of the ever present dangers in seemingly simple affections.

Many conditions are mentioned which do not call for treatment by a chiropodist. He must however be able to recognise them and to refer them to the appropriate specialist *e.g.* a patient often thinks he has a 'suppurating corn' when he really suffers from a diabetic ulcer.

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CHAPTER ONE

THE FOOT

Posture and some Results of Mal posture

IN approaching the study of the foot in health and disease it is essential to bear in mind that no one member of the body can be dissociated from the whole body—if one suffers all the members suffer. Incorrect treatment of a single toe may produce a gangrene with a fatal termination and a neglected tooth may not be recognised as a septic focus until trouble manifests itself in the foot. The chiropodist, therefore, is under the necessity of cultivating a wide watchfulness on all the symptoms and accompaniments of foot discomfort so that the patient's doctor may be called in at once should there be any indication that the case is not a simple localised foot trouble.

The *adult foot* has two important functions and is constructed to perform them with the minimum of effort. These functions are weight bearing and locomotion. To achieve these two ends a system of arches has been developed. The inner margin of the foot (longitudinal arch) is well arched and to a limited degree resilient. At right angles to this there is the posterior transverse arch which is complete only when the feet are placed together. In addition to these mention is sometimes made of an anterior transverse arch in the anterior metatarsal area. These arches are maintained by the shape of the bones, by the tension of the ligaments, by the pull and sling action of the muscles, by fascial bands, and by the elasticity of the skin. Stability is given to the foot by its outer border which should carry the main weight in standing.

In correct walking the heel should touch the ground first, and the weight thereafter should be carried along the

outer border of foot and then passed on to the ball of foot. The spring should come mainly from the head of the first metatarsal and the great toe.

A *new-born infant's foot* upon ordinary examination is soft and apparently without arches. On X-ray examination the shafts of the long bones can be seen, but of the tarsus nothing is visible save an indication of the calcaneum and the talus. Thus no complete bony arch is possible. There is a suggestion of an angle, however, between the calcaneum and the metatarsals which seems to indicate its development. Until this is complete the pads of soft tissue maintain alignment. These pads must slowly be absorbed whilst development takes place in muscles and tendons. These changes are largely brought about by exercise.

Kicking is the only exercise suitable for the lower limbs during the first year of life, so it follows that absolute freedom should be allowed to legs, feet, and ankles if this exercise is to be properly carried out. Mothers and nurses, who are inclined to be over-careful in our inclement seasons to keep the extremities warm, are apt to hinder the exercise with clothing which restricts movement. They should be well warned of this danger and the consequences arising from too little exercise during the first months of life.

Should the child enter the next stage of standing and walking with insufficient musculature, the result will probably be found in weak foot and arch trouble for many years to come.

At birth the child's spine forms one long curve convexly backwards. It gradually develops and grows stronger until the child can sit up and throw back the head. Holding the head up straightens out the curve in the neck and even produces a curve convexly forward, just as later on the assumption of the erect posture produces the normal forward curve of the lumbar region. This is an interesting example of function preceding a structural change. Further muscular development takes place and the curves become more pronounced until the child is able to balance itself and so make standing and walking possible.

At first the infant stands with its feet turned in, far apart

and flat, but the correct adult position for standing is feet pointing straight forward with comfortably straight knees pelvis slightly forward and down with the abdominal muscles well drawn in arms hanging easily from the shoulders which are held back and down and the head well up with chin horizontal

When a child first begins to walk it is sometimes hampered in its development by unwise adult assistance. This is worst when the interference comes always from the same side. Thus a mother may be noticed to use her right hand every time when helping a tired child. This is apt to make the child sidle along taking off from the medial side of the right great toe instead of walking straight ahead. This awkward gait certainly predisposes to hallux valgus in adult life.

During school life it is important that children should be encouraged to sit properly. To this end the seat and desk should be of such size as to enable the feet to be planted squarely on the floor. Modern curricula are as a rule carefully planned to ensure sufficient exercise periods at suitable intervals each day. Free exercise is always to be encouraged but skipping and jumping should be under skilled supervision with frequent foot inspection. Healthy rivalry and a desire to excel at sports sometimes tends to over straining of the feet, and the end result may be severe arch trouble in adolescence.

Growth is not completed when the *scholar leaves school* and often economic causes compel youths to take up work which severely overtaxes the bodily strength. Message boys and young shop girls spend many hours on their feet (often weight bearing) until an incipient flat foot results. Some times there is a condition of muscle spasm frequently in the peroneus longus, which may be associated with overwork or a septic focus elsewhere.

In adolescence unsuitable footwear is a frequent cause of trouble. Boys are often found wearing sports boots or shoes which are too short and with nails protruding through the insole. This is the common age for verrucae. Girls begin to wear high heels and shoes of the 'court' variety this gives rise to trouble in the forefoot. In addition intractable

chilblains are often found in anæmic girls who are wearing too thin stockings.

In middle life feet may give trouble from entirely different causes. Bodily weight generally increases after 40 years of age, and if this is uncontrolled the feet are unable to do their work, hence overstrain and flat foot develop. The ankles often thicken and are disfiguring. Different systemic diseases make their appearance about this time, and sometimes the foot symptoms are the first to give warning of their presence. For example, diabetes mellitus may not be suspected until a minor injury, such as a broken blister, is slow to heal.

In old age there is a definitely senile type of foot. Quite apart from any definite disease symptoms (such as œdema from cardiac weakness), there are clear signs of advancing incapacity. The foot loses its muscle tone and may appear to be slightly longer. There may be a pronounced clawing of the toes, as though the patient was endeavouring to make an effort to compensate for enfeebled musculature.

If the patient insists on carrying out his usual active life, there may be an acute "painful heel" due to subcalcaneal periostitis or fasciitis or merely caused by a hardening of the soft structures. Arteriosclerotic changes appear which lead to impaired circulation and coldness, small abrasions take longer to heal, sepsis has a more serious prognosis, and gangrene is a not remote possibility.

FOOT ABNORMALITIES

FOOT ABNORMALITIES may be divided broadly into two categories —

A CONGENITAL.

B. ACQUIRED

A **Congenital** cases of gross deformities will in all probability be diagnosed at birth and treatment commenced during the first few months of life. Cases of milder deformities should be treated as soon as they manifest themselves. They are all, whether gross or mild, cases for the orthopædic surgeon in the first instance, and afterwards the chiropodist.



FIG 1



FIG 2

Fig 1 shows the feet of a child of 1 year 11 months, and Fig 2 shows her sisters, aged 2 years 11 months. In this family of five children there are two older children of 4 and 5 years who have similar feet. The baby who has not yet tried to walk has perfect feet. In the two photographs notice how the second third and fourth toes are of equal length. In the ordinary shoe this is not allowed for with the result that the second is displaced dorsally and the third fourth and fifth develop an oblique contraction



FIG 4

Shows how marked was the improvement in about twelve months with no treatment other than home manipulations and supervised fitting of ordinary shoes.



FIG 3

Fig 3 shows the feet of a child of 8 years. She had been cared for by different foster mothers, who allowed too small shoes to be worn. The fourth foster mother was keen on restoring the feet as far as possible. She was advised as to footwear and shown how to pull the toes gently into shape several times daily

may be able to assist. Treatments which have been successfully used will be described in a later chapter

FIG 5



FIG 6



FIG 7



FIG 8

Figs 5 and 6 show the feet of a child of 4 years. Figs 7 and 8 show the same feet after five months' treatment with felt toe props

B Acquired abnormalities may result from —

- (1) DISEASE.
- (2) TRAUMA.

(1) DISEASE may be either

- (a) *Systemic* or
- (b) *Local*.

Systemic Diseases which may show manifestations in the feet are anaemia, tuberculosis, diabetes mellitus, rheumatism, venereal disease, circulatory disorders, bone diseases, and nervous diseases. These must in all cases be under the

FIG 9

FIG 10



FIG 11

FIG 12

Figs. 9 and 10 show the feet of a girl of 11 years. On first examination there was a slight stiffness in all the articulations and the patient insisted that her feet had been "like that" for two years. The prognosis for the left foot was good as the swelling round the first metatarsal head was a swelling of the soft tissues only. The prognosis for the right foot was poor as there was definite bony enlargement at the head of the first metatarsal. Figs. 11 and 12 show the same feet after five months' treatment with radiant heat and strapping, as shown in Figs. 128, 129, 130, 131, 133, 136, 137 and 150.

care of the doctor but frequently there is much that a chiropodist can do to give foot comfort. Such conditions are discussed in a later chapter.

Local Diseases which show manifestations in the feet are exostoses, nail irregularities, ganglions, cysts, tumours, verrucae, inflammation of bones and joints.

(2) TRAUMA means injury, and from it abnormalities result in varying degree according to the type and severity of the injury. In the foot the commonest form of trauma is that arising from ill-fitting footwear, but grave forms of trauma, such as fractures, crushing injuries, burns and scalds, must all be included as causes of abnormality.

Amongst the resultant abnormalities must be classed the minor foot deformities such as hallux valgus, hallux rigidus, and hammer toe, and in addition corns, verrucæ, and many nail conditions.

Footwear is discussed in Chapter Eleven, but some photographs of young patients at the Edinburgh Foot Clinic are given here to illustrate the results from wearing unsuitable shoes in childhood.



FIG 13



FIG 14

Figs. 13 and 14 are two views of the feet of a girl of 12 years. When examined she was wearing cast-off woman's shoes several sizes too large previously she had worn outgrown child's size. Note the disappearance of the arch under weight bearing also the hard corns with abundant callus at the pressure points. There is incipient hammer toe of the second digit due to the pronounced hallux valgus.

CHAPTER TWO

THE SKIN

Various Skin Affections and Perspiration Abnormalities

THE SKIN is the outer covering of the body. It is similar in structure all over the body although it varies in thickness. For full details of the histology of the skin the student is referred to a textbook of dermatology. Fig. 15 is intended to illustrate in diagrammatic fashion the

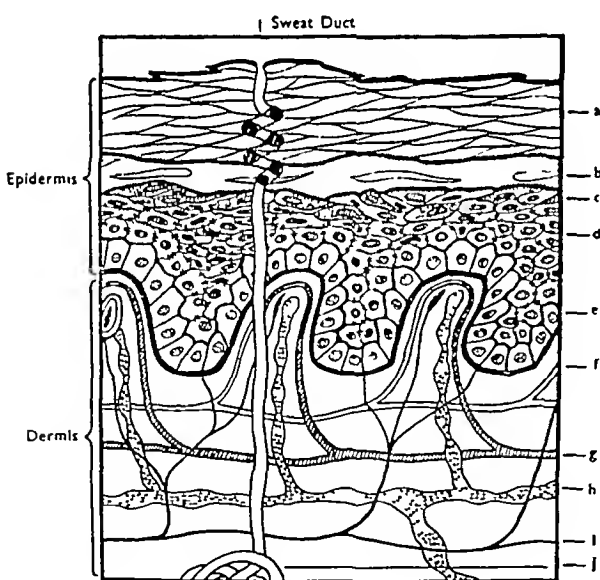


FIG 15

Diagram of microscopic section of skin

a, s. corneum, *b*, s. lucidum, *c*, s. granulosum, *d*, prickle-cell layer, *e*, s. aculeatum, *f*, s. basale, *g*, artery, *h*, vein, *i*, lymphatic, *j*, nerve, *k*, sudoriferous gland

appearance of a section of the skin when viewed through the microscope. It will be noticed that there are two main divisions —

- (a) *Dermis*, the inner layer, or cutis vera
- (b) *Epidermis*, the outer layer.

The former consists of thick dense layers of connective tissue abundantly supplied with blood-vessels and nerves. The latter consists of several layers of epithelial cells, only the

basal layers of which have a blood or nerve supply. These basal cells are continually producing daughter cells which spread outwards to the surface. As they travel towards the surface they become very irregular in shape and there

appear to be little bridges of cell matter from one cell to another these are called prickle cells. Still nearer the surface the cells are found in continuous deposits of keratin with the result that when they reach the surface they are completely keratinised and are hard and lifeless. These surface cells are always being rubbed off e.g. by contact with clothes and are replaced by fresh cells from beneath.

One of the most important functions of the skin is protection of the underlying tissues both from injury and invasion. When the skin is injured the basal cell layer proliferates and repairs the epidermis. But sometimes friction too weak actually to injure the tissues, will stimulate the cells to proliferate and the epidermis will therefore become very much thickened. Such a condition may result from occupational causes e.g. horny hands from long continued digging the hands of a cricketer or the feet of anyone accustomed either to go barefoot or to wear shoes which are too loose. This hypertrophy of the epidermis is known as callus formation.

Another function of the skin is that of sensation. The nerve endings in the basal layer of the epidermis are very sensitive and so we are able to appreciate the sensations of touch heat cold and pain. The skin helps to regulate the heat of the body by the function of perspiration yet the skin although porous is sufficiently waterproof to enable one to remain immersed in water for a considerable time without harm.

As far as chiropodial operations are concerned the unbroken skin is a defence against the entry of the vast majority of micro-organisms. When it is broken however these invaders (bacteria, viruses, and fungi) may enter and lead to very serious consequences.

SKIN AFFECTIONS

SKIN DISEASES should always be referred to a medical man for diagnosis as there are many types which are readily contagious. Some, like scabies are due to parasitic infection.

others, like ringworm, to fungous infection ; and still others, like lupus vulgaris, are due to bacterial infection

When a patient remarks that he is " frequently bothered with eczema " the chiropodist should see to it that he has a doctor's advice as speedily as possible, since many skin diseases have vesicular similarities and differences which can be rightly distinguished only after microscopic examination. The more common of these are listed in the classification on p 147, but this is for reference only—the chiropodist must not attempt to treat them until the treatment has been prescribed by the doctor

The following will be considered as they are very liable to arrive in a chiropodist's surgery —

" Athlete's Foot."

Blister.

Corn.

Verruca.

Syphilis.

Fissure.

Mole.

TINEA INTERDIGITALIS (or TINEA PEDIS or DERMATOPHYTOSIS) or "ATHLETE'S FOOT"

A special look-out must be kept for " athlete's foot," so called because of the frequency with which it occurs in athletes who walk barefoot in gymnasiums, swimming pools, etc

Etiology—It may be due to the epidermophyton or trichophyton fungus, and is a type of ringworm. In appearance between the toes it strongly resembles patches of white blotting-paper. When these rub off, the skin is left very raw and liable to invasion by any of the micro-organisms which inhabit footwear. It may appear as a dry scaling between the toes, and on the soles as an entirely vesicular eruption or as a combination of both

On the feet it occurs principally in and around the webbing of the toes, though it often spreads on to the dorsal and plantar surfaces and is also found in fissured heels. Fig. 16 shows where the disease has invaded the area between the first and second toes with consequent fissuring. It is easily communicated from one person to another, and any patient infected with it should be careful that his socks and

towels, etc., are laundered apart and disinfected. It is very difficult to eradicate since reinfection is apt to occur from the footwear, the bedroom floor, or the bath mat.

Treatment is difficult because any chemical strong enough to destroy the fungus is also apt to destroy the epidermis. In actual practice it is better to tone up the skin and so bring the natural defence mechanism into normal functioning as the affected area is generally moist and in a relaxed condition.

When the chiropodist encounters a suspicious case he must be careful not to confuse it with simple fissure, maceration or soft corn. The corn has a nucleus which 'athlete's foot' has not though the latter may have a small sago-like appearance in its initial stage. If the disease has invaded the nails they will be thick and



FIG. 10

Athlete's foot with fissure

spongy. Only microscopic investigation can determine the diagnosis, so that a dermatologist should be consulted.

A simple, safe and effective treatment for almost any type of ringworm is to soak the feet night and morning in a 1/5000 solution of potassium permanganate.

BLISTERS

A BLISTER is a superficial elevation of the epidermal layers which have been separated from the dermis by the exudation of serous fluid or blood.

Many skin diseases and other general diseases such as diabetes have vesicular developments, but these do not come within the chiropodist's sphere. He may only treat blisters of traumatic origin.

Etiology—A blister may be the result of friction, or

burning, or scalding. It may appear wherever friction occurs, but the usual positions are —

Posterior surface of heel

Adjacent to the long extensor tendon on dorsum of hallux.

Plantar surface of toes and ball of foot.

Such blisters are generally caused by a hard, misfitting shoe, and this must be put right at once.

Treatment.—If not inflamed, the blister should be punctured (see p. 15). The puncture should be in the position from which drainage will most easily take place, *i e.*, downwards. A section of the epidermis may need to be removed to prevent the blister closing and reforming. When new epidermis is developed the old skin must be removed at once to prevent further irritation.

The dressing should be some sterile lubricant (see p. 194), together with a protective pad of thin felt and gauze. If the back of the heel is affected a pad of thick felt may be placed in the shoe under the plantar surface of the heel to raise the foot above the hard counter of the shoe. If the blister is far down on the tuberosity, then it will be necessary to place a crescent-shaped pad for protection at the back of the heel, but care must be taken that this does not in effect make the shoe too short and thus cramp the toes. In a severe case the hard counter at back of heel may be cut away and a piece of elastic webbing substituted.

When the blister is near the great-toe tendon there should be a crescent of adhesive felt placed proximal to the blister, having the adhesive cut away immediately over the tendon in order to allow full play to the tendon (a "saddle" pad).

If the blister is inflamed it need not be punctured unless it is so large as to interfere with the fit of the shoe. The inflammation is an indication that healthy epidermis has not completely developed under the blister. As some individuals are careless in regard to their feet, it is unwise to let a patient run an unnecessary risk of septicæmia by premature puncture of the blister. The inflamed area should be dressed with any mild antiphlogistic preparation, such as Witch Hazel or Burow's solution, or zinc and boracic ointment with the addition of a soft protective pad.

When necessary to puncture, this should be done with a surgically clean instrument and as close to the circumference as possible as there the healing process is likely to be more complete than in the centre (Remember an infected blister on the foot has often had a fatal termination as reported in Coroners inquests from time to time)

If the blister is broken and raw antiseptic treatment must be carefully followed—a hot home soak (with oiled silk or cellophane) frequently renewed for the first day and then some ointment such as Iodex or TCP or Ichthiol and glycerine. The dressing should be changed daily to avoid hardening. If the surrounding area is swollen and does not yield to this treatment by the second day a radiant heat treatment with Iodex might be given and the case must be referred to a doctor at once as there is grave risk of cellulitis supervening.

Prophylactic Treatment—The footwear should be suitable, shoes not too hard and socks not too long or too short and free from darns.

Powder should be used liberally to minimise friction. In the course of a long hike it is good to rest at midway and change each stocking to the other foot. This gives the foot a little fresh air and sunlight permits of repowdering and alters the strain on the toes of the sock thus preventing a possible hole and darn which is undesirable. It is better still to change to a fresh pair of socks.

Before setting out on a walking tour patients should be advised to prepare their feet for some time beforehand by nightly bathing in warm water to which has been added one teaspoonful powdered alum or a few crystals of potassium permanganate sufficient to make the water pale pink only. This will help to toughen a moist skin. If the skin is already too dry there should be treatment only with a lubricant such as olive oil well rubbed in.

CORN

The English name *corn* is derived from the Latin *cornu* a horn which is a little more elegant than the German name which signifies a hen's eye. 'Clavus' is another term which

used to be employed and is merely the Latin name for a key; "spina pedum" was used by Lion (1802) and implies a thorn of the feet. More recently, American chiropodists have introduced the term "heloma," which they have derived from the Greek *helos*, which was a stone wedge used by ancient builders instead of our modern nails in construction.

Definition.—A corn is a localised thickening of the epidermis due to excessive intermittent pressure meeting with resistance and occurring over some bony prominence, which latter is either abnormally developed or else not normally functioning. Corn development is usually preceded by the formation of callus. This latter is a thickening of the skin (also known as callosity and tylosis) and is a normal product of friction between the shoe and the foot. The skin reacts in accordance with the physiological principle that intermittent, non-injurious stimulation causes hypertrophy. Callus, therefore, may be said to fulfil a physiological purpose and should not be interfered with unless it is so excessive as to cause inconvenience. When callus is localised over some acquired prominence such as a subluxated joint of a toe or a small bony outgrowth, its growth outward is limited by the resistance of the shoe, and thus a corn is formed. The active pressure comes from the toe, and this moulds the corn according to the shape of the bony prominence—hence the well-known nucleus which forms in the deeper layers of the epidermis.

There are four usually accepted classes of corn: **hard, soft, vascular, and neurovascular** (*heloma durum, molle, vasculare* and *neurovasculare*). Miliary corns are not included here as they do not come within the definition, occurring as they do irrespective of pressure. They are dealt with at the end of the section.

Hard Corn.—This occurs on the surface of the foot over some bony prominence. The usual situations are: (1) over an interphalangeal joint of the toes, (2) over the plantar surface of a metatarso-phalangeal joint, (3) at the apex of a toe, (4) in the sulcus of a nail, (5) between the first and second toes due to resistance from opposing nail.

Etymology—It is caused by the intermittent excessive pressure of a bone against the constant resistance.

If the above situations be examined closely it will be

observed that corns do not develop so long as the foot is functioning normally, but when a bone is forced into an unnatural alignment, *e.g.*, the oblique contracture of the fifth toe a corn may develop. It is important to remember that the active, irritating pressure comes from the foot and not from the shoe. It used to be believed that the pressure came from the shoe but it is now realised that it is the unnatural position of part of the foot that produces the excessive

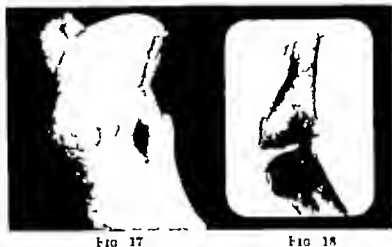


Fig 17 shows a corn on surface over subluxated joint in Fig 18
Fig 18 shows an X ray of subluxated interphalangeal joint.

pressure which leads to corn formation. This explains why it is so difficult to eradicate a corn finally. It is easy to modify the resistance of a shoe, but it is very difficult to remove the continued irritation of a subluxated joint beneath a corn. The unnatural position may be caused by unsuitable footwear.

The subluxation of the joint is a very important feature in dealing with the corn. Callus is frequently found on the surface of the fifth toe due to friction with the shoe. This gives no discomfort until the toe joints become subluxated when a corn speedily develops. This pressure is similar in corns occurring on any of the joints. Figs 17 and 18 show a subluxated interphalangeal joint and subsequent corn (vascular).

Callus is common under the heads of the metatarsals. It is usually caused by the slipping about of the foot inside a too roomy shoe. This condition may give rise to little



FIG 19

Shows feet where hard plantar corns have developed on the weight-bearing points. The patient was a man of 51, and they had existed many years without any treatment. Note also the hard corns on the apex of the fourth toes.



FIG 20

Enlargement of Fig 19 showing a sinus which was exposed on enucleation of the corn.

discomfort as long as the proximal phalanges are in proper alignment. But should a short shoe or sock be worn or should the patient adopt a gripping attitude with the toes or wear an over high heel the toes will be flexed dorsally at the metatarsophalangeal articulation. Should this be persisted in to the point of subluxation there will be a consequent irritation of the tissues between the bones and the callus. This if neglected will result in a deep-seated sharp-pointed concentration which we know as the nucleus.



FIG. 21



FIG. 22

In the case of a corn occurring in the nail sulcus of the hallux or of the second toe it will be found that the nail fold is pinched between the nail and the malaligned neighbouring toe.

In the case of the third, fourth and fifth toes it often happens that they are obliquely contracted and in walking the weight of the body passes along the lateral edge of the distal

Figs. 21 and 22 seem similar to Fig. 10 but the left foot was trampled on in childhood by a horse hence the contraction of the third and fourth toes. The corn under the fifth metatarsal head had no sinus but was very vascular. Fig. 22 is the lateral view of the left foot.

phalanx (which is not adapted for weight-bearing) and a corn eventuates.

Apex corns develop usually on the second, third, or fourth toes when these are abnormally long and forced into plantar flexion by short footwear, thus bringing undue pressure on the tip, which is not adapted for weight-bearing. The corn is sometimes found underlying the nail at the distal edge.

If there is osteo-arthritis, and the formation of osteophytes, or the presence of an old scar, the consequent irritation is exceedingly liable to produce a corn.

All those corns on the outer surfaces are called hard corns. Their treatment is described on pp 25-28.

Soft Corn.—This is very commonly found in pairs between the toes.

Etymology—These have been brought about by undue pressure between the prominences of the phalangeal joints of adjacent toes. Owing to the excessive heat and moisture between the toes the thickened epidermis is soft and rubber-like, hence the corns are known as soft corns. Structurally they do not differ from hard corns except that the latter have a hard, concentrated centre, called the nucleus, which points inwards, whilst the nucleus of a soft corn is frequently ring-shaped, conforming to the shape of the bony prominence.

Soft corn is very apt to be confused with tinea or "athlete's foot" (see p 12), so that much care should be taken to examine for the nucleus which is found only in corns.

Soft corn may be situated between any two adjoining toes, but is most often found between the fourth and fifth toes. If it occurs on the web between any two toes, then the abnormal friction is between the proximal phalanx and the metatarsal head of the neighbouring digit. Thus if a corn is situated in the web between the fourth and fifth toes it will be found that both toes are obliquely contracted and the proximal phalanx of the fifth is forced back on the head of the fourth metatarsal which is malaligned (Fig 23).

The treatment of soft corns is indicated on pp 25-28.

In all this cornaceous development, whether hard or soft, there is no disease of the skin. The epidermis has responded in a perfectly normal manner to an abnormal condition.

The Pathological Condition arises when the nucleus is

pressed into the soft underlying tissues and prevents some of them from functioning naturally (see Fig 24). The papillae immediately beneath the corn are flattened and those surrounding it are enlarged. This produces the symptom of pain due to the pressure on the nerve endings. There is an increased supply of blood to the capillaries, and at every pulsation these impinge on the nerves and cause the well known throbbing stabbing pain of an inflamed corn. The

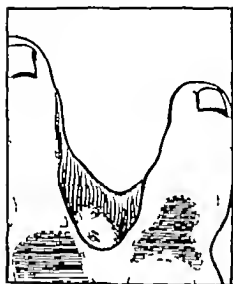


FIG 23

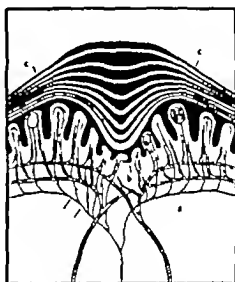


FIG 24

Fig 23 showing development of soft corn in web between fourth and fifth toes. Note the shaded metatarsal head and proximal phalanx between which undue pressure is produced when a wrongly fitted shoe is worn.

Fig 24 showing flattened papillae at *a a a* under a corn *b* and enlarged papillae at *c, c*.

removal of the corn will allow these capillaries to resume their usual size again and the pain ceases, the part has a chance to return to the normal until once more irritated.

Should the corn not be removed there will be an attempt on the part of Nature to relieve the pain.

The tissues under the corn may be slightly ruptured by a sudden jar and in the cavity thus formed by repeated rupturing there will be a small accumulation of serous fluid. This will gradually be enclosed in a small sac and will constitute a buffer protecting the dermis from pressure from the bone and the bone from injury from the sharp nucleus.

When this condition arises on the dorsum of a toe it is sometimes referred to as **bursitis**. This is not strictly correct, as there is no synovial fluid in the sac. Pseudobursitis would be a more suitable term, but cyst is more correct (see Fig 25).

At this stage, if correct footwear be adopted and the malalignment reduced, there is the possibility that the sac may become

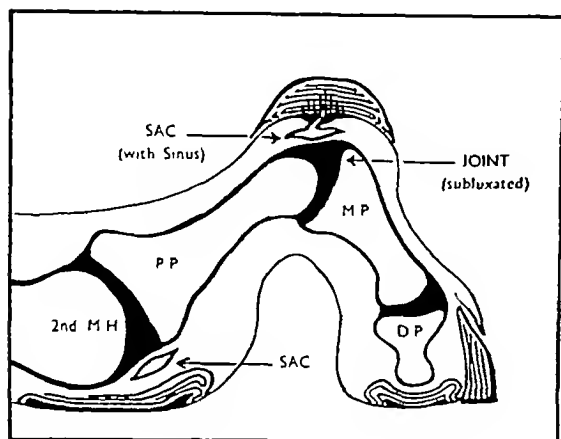


FIG 25

Showing a sac under corns on subluxated metatarsophalangeal joint and interphalangeal joint, and corn on terminal phalanx of hammer toe

MH, Metatarsal Head, PP, Proximal Phalanx,
MP, Middle Phalanx, DP, Distal Phalanx

a permanent feature and all painful symptoms will disappear. But a change in style of footwear and consequent alteration in the relative position of the bones will be apt to cause another onset of the inflammation.

Vascular Corn.—This is a variety of hard or soft corn in which the dermis, with its accompanying vessels, approaches the surface of the epidermis in one or more points through the callous development.

Its appearance is suggested in the frontispiece

On removing a thin layer of epidermis from a vascular corn one or more red or black specks will appear. These are the endings of the capillaries, which are very easily ruptured, indeed they sometimes seem to bleed spontaneously owing to the pressure from the surrounding corn or callus.

Etiology—Two possible causes have been suggested: repeated slight trauma either from (1) a subluxated joint, as shown in Figs 17 and 18, or (2) from unskilful cutting of a corn. If a corn is "relieved" by cutting but not completely enucleated, it means that the hard skin has been sufficiently removed to allow the underlying capillary loop or loops to swell out at one side and ease the pressure on the nerve or nerves. Or it may be that the "cutting" operation has been accompanied by slight hæmorrhage. In either case it follows that there is less thickness of epidermis over one side

of the corn than over the other and the capillary loops will tend to be pressed to the site of least resistance. When this is repeated time after time there is an irregularity in the strata of the epidermis and the papillæ are allowed to approach the surface through these minute points of thin epidermis (see Fig 26). Treatment is described on p. 20.

Neurovascular Corn — This is a further development of the vascular corn in which there are involved one or more of the nerve endings situated close to the surface of the dermis.

Etiology — The etiology is the same as for vascular corn, and its treatment is described on p. 30.

Verrucosity — Experience in the Edinburgh Foot Clinic has led to the setting up of an additional classification of corn *i.e.* verrucosity. The name

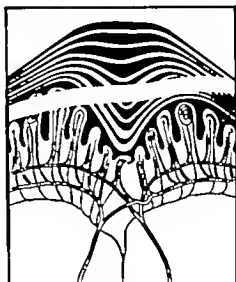


FIG 26

Diagram to indicate development of vascular corn. The upper layer of corn has been carefully cut away, severing the tips of two enlarged papillæ.



FIG 27

Fig 27 shows the completed enucleation of a verrucosity *i.e.*, a border line case between hard corn and verruca. It resembles the latter in that it is vascular and has a deep-seated bulbous swelling but it has abundant surface callosity and no line of demarcation. For years the growth between the heads of the first and second metatarsals had given great pain and had been treated as a vascular corn with nitrate of silver and pyrogallol acid. Very little enucleation had ever been achieved because of the pain arising from the neuro-vascularity. The case was regarded as a chronic case which could only be alleviated by padding. Then treatment was started as for a verrucosity with an ointment composed of equal parts of 75 per cent. salicylic in lanoline and T.C.P. ointment. The growth responded at once and with six treatments

at monthly intervals the tumour-like development entirely disappeared. The photograph shows the appearance in the middle of this course of treatment.

and idea were alluded to by Whitfield in the *British Journal of Dermatology and Syphilis*.¹ Others have called it a fibrous corn.



FIG 28



FIG 29

Figs 28 and 29 show the symmetrical arrangement of so-called seed-corns on the feet of a middle-aged woman. Note that the corns have developed independently of pressure, and each has a well-defined line of demarcation and no surrounding callus.

The investigations at the E F C are not yet concluded, but they bear out the observation that the "verrucosity" resembles a verruca in its vascularity and apparent tumour but differs from it inasmuch as there is no line of demarcation round the former (There is abundant callus round a verrucosity, but very little if any round a verruca). Treatment is similar to that of a verruca, and although after a "final" treatment it does not readily recur, the treatment is always protracted and the progress often uncertain. The condition is more commonly found in men than in women, and seldom appears before middle life. There is on record a number of cases associated with severe chilblain or "trench foot" contracted during the Great War, 1914-18. These proved particularly resistant to treatment.



FIG 30

Shows a foot in which—owing to short footwear—the toes are at a pronounced angle to the metatarsals and the extensor longus hallucis is much contracted. A seed-corn has developed in the cicatrix of a formic-acid burn incurred in the course of the patient's employment, and there is a complete line of demarcation with absence of callous formation. The other foot is identical in shape but has no "seed-corn."

Miliary Corn or Seed Corn.—It is doubtful if these come into the category of corns. They

¹ *Brit. Jour. of Derm. and Syph.*, Dec. 1932, p. 585.

consist merely of an exceedingly hard 'seed' without any surrounding callosity. They lie on the surface generally in the fleshy parts of the heel and instep. They do not occur in connection with any joint or bony prominence and seem to be unconnected with friction. They are usually multiple and are sometimes associated with anhidrosis. Their treatment is indicated on p. 31.

CHIROPODIAL PROCEDURE

(1) ANTISEPSIS AND ASEPSIS, (2) ENUCLEATION AND AFTER-CARE

Asepsis—A full study of bacteriology is outside the scope of this book which only aims at conveying to the student a working knowledge which will be of use in his practice.

Until the investigations of Pasteur and Lister micro-organisms were unknown as disease carriers although their effects were everywhere manifest. The skin is the most perfect protection from them *as long as it is unbroken* as some of its secretions are bactericidal, but even the most minute puncture is sufficient to permit the entry of germs with possibly a fatal termination, so that the study of aseptic precautions is of the utmost importance to the chiropodist.

The surgeon's precautions are, perforce as complete as possible, as he is constantly exposing an open wound—hence the elaborate preparation of a surgical theatre. The chiropodist occasionally has an open wound to deal with and when one does occur it is essential that it be kept surgically clean, i.e. free from any invasion of bacteria, viruses, or fungi.

There are two methods of obtaining this surgical cleanliness

- 1 By heat—for instruments and dressings
- 2 By chemical agents—for instruments and field of operation

Heat Sterilisation can be obtained by any of the ordinary apparatus on the market—from the simple bath in which to

boil instruments to the elaborate sterilisers in which super-heated steam is the agent.

Chemical Agents are enumerated in Chapter Twelve under Drugs and Dressings.

As far as the chiropodist is concerned there are five main sources from which infection may enter a wound

- 1 From the operator's hands.
- 2 From the surface of the foot.
3. From a dirty instrument.
4. From infected coverings.
- 5 From the air

1. The operator's hands in chiropody should never come in contact with broken skin, so that social cleanliness is sufficient for them

2 The surface of the foot is always a source of danger It can never be rendered perfectly sterile without injuring it, so that it should be swabbed with methylated ether and the area of operation kept well cleansed with frequent applications of 1 per cent Lysol, or 1 per cent IZAL, or 1 per cent Dettol (Carbolic is seldom used as a skin disinfectant in chiropody owing to the danger of carbolic gangrene Carbolic does not easily dissolve completely, and a tiny globule of the full strength may be floating in a weak solution) A piece of lint soaked in the antiseptic should be applied to the area for a minute or two before using the scalpel.

If *very* slight hæmorrhage does occur the part should be treated with hydrogen peroxide or tinct benzoin co and antiseptic gauze or wool, with light digital pressure, *and left alone* until the bleeding stops If the bleeding is more profuse, Witch Hazel or 5 per cent silver nitrate in water is a suitable styptic applied on sterile lint or wool and held with firm digital pressure for a short time (see also Cellulitis) It is necessary to leave a sterile dressing on the part

3 All instruments should be kept in 2½ per cent. Lysol or Dettol whilst a patient is being treated In addition to this it is necessary—after they have been in contact with pus—to immerse them in pure Lysol for forty minutes or boil them for twenty minutes. Ordinary scalpels should have a little soda added to the water to keep them from discolouring.

Stainless steel is not affected by boiling though frequent boiling is apt to blunt any cutting instrument

4 All dressings coming in contact with broken skin must be sterile

An aseptic dressing usually consists of plain gauze or lint which has been rendered sterile by superheating

An antiseptic dressing consists of lint or gauze impregnated with some such agent as acriflavine or boric acid which have the property of delaying micro-organism development long enough to allow healing to take place

5 Every break in the skin must be covered from the air at the earliest possible moment

ENUCLEATION AND DRESSING

The aim of the chiropodist should always be to enucleate the corn not only completely but painlessly and bloodlessly. This can only be learned from careful observation of the methods employed by different practitioners

The underlying fact upon which success depends is that there are neither nerves nor blood vessels in the epidermis, so that theoretically there should be little difficulty in treating a superficial outgrowth (Never forget the aseptic precautions described on p 26)

The first point of importance is to watch the left hand fingers of a right handed operator. They are continually presenting the corneous surface to the scalpel in such a way that the surrounding skin is in a condition of extreme tension. This prevents the skin from sagging inwards under the weight of the instrument thus any painful pressure upon the nerve-endings is eliminated. The same careful technique will also prevent bleeding

The two factors to which a beginner should pay particular heed are —

- 1 The *skin tension* must never be relaxed whilst treatment is in progress
- 2 The *instrument* must be as *light* as possible *absolutely sharp* and of suitable shape. An almost imperceptible roughness in the edge will be sufficient to cause an abrasion and bleeding

ENUCLEATION OF HARD CORN

In enucleating a hard corn the beginner is advised to begin by removing the surrounding callosity, working round the circumference with the edge of the scalpel directed away from the nucleus; thus any pressure on the tender area will be avoided. The scalpel should be used with light, quick, glancing movements, using the sharpness of the instrument rather than pressure to sever small flakes of epidermis. When the surrounding and overlying callus has been removed and only the nucleus remains, it will be found that the best results will be secured by a short-bladed, fine-pointed scalpel. By using it in a somewhat spoon fashion, and retaining very firm skin tension, the chiropodist can "lift" the particles of corn from the surrounding tissue whilst the patient is quite unaware of any discomfort. Finally, an antiseptic dressing (see pp 184, 193) should be applied and a protective pad when necessary (see p. 151).

ENUCLEATION OF SOFT CORN

The technique of scalpel work in the treatment of a soft corn differs from that employed in dealing with a hard corn. The movement is slower, and great care has to be exercised in controlling the instrument, special types of which are designed for interdigital work.

After enucleation the corn may be dressed with an astringent or a caustic, or if inflamed, any antiphlogistic. It is not desirable to use a thick wedge of cotton wool or felt to separate the toes, as this is not allowed for in the fitting of the shoes. A *very thin* layer of wool may be used to prevent friction or a very small crescent pad of felt—in conjunction with some healing lotion or ointment (see Chapter Twelve).

When a sac has developed beneath the nucleus of the corn, either hard or soft (see p 21), complete enucleation usually effects an entrance into it. A very small quantity of serous fluid—either colourless or slightly yellowish—will exude. The cavity should be carefully washed out with hydrogen peroxide. Strong solution of iodine may then be introduced

into it or a small drop of pure phenol on a wooden applicator in order to obliterate the walls of the sac and allow normal granulation to proceed. If phenol has been used it will be necessary to neutralise it after two minutes with alcohol. The part should be dressed with some mild astringent as Friars' Balsam hamamelis, or *ruta graveolens* lotion.

SEPTIC CONDITIONS

When fluid oozing from under a corn is definitely pus the operator must bear in mind that sepsis is either focal or local in origin (see p. 81 also Brodie's Abscess p. 125).

If there is no history of recent injury to the skin the patient should be advised to see his doctor to be examined for possible septic foci such as tonsils, gums, etc.

When the chiropodist first sees the case the foot may be suffering as the result of a very recent maltreatment. The surrounding tissues may be highly inflamed or the skin may be broken. In this last case he must realise that possibly micro-organisms have already entered the wound.

The immediate treatment given by the chiropodist should consist of removal of as much of the corn as possible without further injury—drain away the pus and wash out the cavity with hydrogen peroxide—apply a wet dressing of some mild antiseptic such as acriflavine or T.C.P. lotion and protect the part with a suitable pad. The patient should be instructed to rest and use hot fomentations of boiled water at home. If the condition does not show distinct improvement within twenty-four hours the chiropodist should insist on having medical advice.

Subsequent dressings might consist of iodoform or B.I.P.P. or Burow's solution.

It should be remembered how easy it is to mistake a perforating ulcer for a septic corn (see p. 80).

ENUCLEATION OF VASCULAR CORN

When the corn is vascular the chiropodist will find his difficulties much increased. The first procedure will be to cleanse the area thoroughly and remove as much of the callous

growth as possible without causing hæmorrhage. There may then be the problem of enucleating a corn consisting of a dozen small specks each associated with its own vascular area. This done, some astringent dressing should be applied, such as hamamelis, aluminium acetate, silver nitrate, or alum exsiccatum, and a suitable protective pad.

The same treatment can be followed on subsequent visits at intervals of a day or two for inflamed cases, or up to a fortnight later if there is no inflammation. In the meantime the patient might have an astringent lotion to dress the part daily (see p. 189).

It is not wise to use oiled silk for long on the toes as the poultice effect produces a relaxation of the skin instead of the astringent effect which is desired.

ENUCLEATION OF NEUROVASCULAR CORN

NEUROVASCULAR CORNS are the severest test of the chiropodist's skill as an operator. Owing to previous maltreatment one or more of the nerve endings have approached the surface of the epidermis and the corn is in a highly sensitive condition. The patient generally is very apprehensive of any handling of the part, so that the chiropodist, whilst being perfectly confident in his approach to the work, must also be sympathetic and reassuring. In such a case great skill and care are needful if the operation is to be successfully completed. A very fine scalpel, exceedingly sharp, should be used. Skin tension and lightness of touch are especially important in this condition.

As much as possible of the callous skin and of the nucleus must be removed without hurting, then a meagre dressing applied of 20 per cent. salicylic in lanoline—with a suitable protective pad—and all covered in with adhesive tape. If the patient returns in four days the part will be amenable to treatment similar to that for vascular corn.

If it is impossible to treat the foot at all at first, then a minute drop of pure phenol may be applied to the centre of pain. After two minutes it should be neutralised with alcohol and the enucleation proceeded with.

ENUCLEATION OF SEED CORNS

MILIARY OR SEED CORNS rarely give the patient any pain although there may be a score or more of them under the heel. A single one may be enucleated as an ordinary hard corn but if there are many this would be a lengthy process. If there are several they may be treated with 5 per cent salicylic ointment but if they are very numerous it is more convenient to use a salicylic plaster (5 per cent) all over the area after three days it will be a simple matter to remove the corns. As an after dressing any adhesive plaster which the skin will tolerate may be worn. Good results also follow daily rubbing into the skin of olive oil or lanoline. This treatment has the effect of mitigating the dryness of skin which occurs with milary corns.

VERRUCA

VERRUCA is the Latin name for wart and *verruca pedis* is the term usually employed in chiropody to denote what has been at different times called papilloma (tumour of the papillæ) or acanthoma (tumour of the acanthus or prickly layer in the epidermis).

Signs—In appearance verrucae may vary in shape colour and consistency and have been classified as (1) arida or dry (2) humida or moist. In all cases however the striæ of the skin are interrupted and there is a distinct line of demarcation. Also in a well established case a small tumour can be felt immediately below the level of the skin. Generally there are several small black specks scattered through the surface of the verrucae. These are due to small hæmorrhages of the tips of the papillæ. There is no nucleus as in a corn but the growth throughout is yielding though tough. Runtz (Practical Chiropody p. 38) describes it as 'spongy or rubber like or of cauliflower appearance'. Sometimes it is distinctly tufted. In addition to these characteristics it is very liable to bleed on cutting.

Verrucae may be single or multiple a 'satellite' appearance is very common. There is rarely much callus overlying or surrounding them.

Symptoms.—The most characteristic feature is a sharp pain which is felt on first rising in the morning yet which disappears when a firm shoe has been worn for a short time. The reason for this is that the growth consists largely of a hypertrophy of the papillæ with consequent increase in the number of capillaries. These are distended overnight, and on first putting the foot to the ground they impinge painfully on the nerve endings. After a firm shoe is worn the circulation is somewhat retarded and the vessels in the verruca shrink sufficiently to give some relief.

Occurrence.—It occurs usually on the plantar surface of the foot or toes, though it may occur on any part. The exciting trauma may be irritation from a stud (such as is used in golfing shoes) or it might be the premature breaking of a blister.

In absolutely robust condition the skin would be able to deal with such a minor accident quite satisfactorily and heal without further development; but it has been observed that verruæ are found most frequently when the skin is in a relaxed condition, which may occur after an acute illness, or in rapidly growing children, or in swimmers, or when rubber shoes are persistently worn. It is notorious that verruæ are more commonly met with in private practice than in hospital work. This is presumably due to the fact that private patients are more addicted to bathing than clinic patients, hence a more delicate skin. In very recent times it has been observed that there is a striking increase in the number of cases occurring in clinic practice after the opening of any new swimming pool.

As far as observations go, one attack of verruca frequently renders the patient immune. Out of several thousands of cases the writer has found only three definite recurrences: one patient had a second and third attack after an interval of about seven years each time, another had an interval of four years between the two attacks, the third had an interval of eight years. It has been clearly proved experimentally that three attacks of warts confer immunity.

Etiology.—Verruca must not be confused with vascular corn which it somewhat resembles. It has no relationship with a corn at all, although sometimes erroneously termed a

'fibrous corn' A corn is a hypertrophy of the horny layer. A verruca is a neoplasm (or new growth), which is a pathological condition. It is a benign neoplasm that is it confines itself to the tissue in which it originates whilst a malignant neoplasm invades other tissues hence it should not be mistaken for epithelioma which is malignant (The latter has generally a scab formation and is apt to ulcerate on the surface.)

Sampson Handley, finding in papillomata histological evidence that the lymphatic vessels of the papillae are blocked by lymphangitis, ascribes the formation of papillomata to lymph stasis. He says The papilla is a little physiological engine. From its blood capillaries there exudes into its connective tissue a constant nutritive stream of dilute blood plasma at a certain pressure. The excess of fluid is removed and the equilibrium maintained



FIG. 21

Shows a very distinct specimen of a "satellite" verruca. It had been treated once with pyrogallie acid before the photograph was taken.

by the drainage action of the central lymphatic (which is a blind finger like structure in the centre of each papilla). Block this lymphatic and what will happen? The first effect will be a rise in the pressure in the intercellular spaces of the papilla, and on ordinary hydraulic principles the papilla will increase in size until the intercellular pressure is equal to the pressure in the capillary blood vessels. A second

effect will be over-nutrition and consequent proliferation of the papilla itself and of the overlying epithelium." ¹

The experiments of Wile and Kingery showed conclusively that warts were produced by a dermatropic filterable virus, and that verruca plantaris is due to precisely the same cause as the common warts of the hands but modified by environment

On the other hand, Whitfield says "They may be infective in origin, and are generally considered to be always of this nature For some years, however, I have been doubtful of the correctness of this view I was first led to this doubt by an observation on my own hand. One day I dropped a comb, and in trying to catch it struck my thumb sharply against the smooth back of it The first sign of trauma was a small bruise, but as this subsided it was followed by the appearance of a small telangiectasis, which was undoubtedly a minute traumatic aneurysm, as pulsation could be observed in it with the aid of a lens Some weeks later a small wart developed over the telangiectasis and remained stationary until I destroyed it by electrolysis. Now the thin soles of shoes have no nails in them, and I have had careful note made about the insides of the soles of their boots by footballers with warts, and in many instances no projecting nails have been found but only a domed irregularity of surface where the stud has pressed up the sole Inoculation is not thereby ruled out, but is rendered less likely On the other hand, sudden unequal pressure when playing on hard ground would be likely to cause bruising such as occurred on my thumb, and a small traumatic aneurysm might result Such warts would be more likely to be single than multiple, and would be very unlikely to show the 'star and planet' or 'mother and daughter' arrangement so commonly seen in the case of the ordinary infective wart This is precisely what is found Footballers' warts are usually either single or few in number, and do not show the arrangement referred to above

"Again, in a very small percentage of sufferers from chilblains, telangiectasis succeeds the initial lesion, and this becomes later capped by a wart—angiokeratoma . .

¹ "Genesis of Cancer," p. 44

I should like to make it clear that I do not think all warts are traumatic in origin, and there is nothing of course, to prevent a footballer from acquiring the infectious form, but I feel quite confident that single warts may be produced by trauma without infection"¹

J M H MacLeod says 'A primary hypertrophy of the



FIG 32

Shows a case of multiple verrucae. Note the characteristic "black specks" in the verrucae at the base of the third toe. The other verrucae had been treated with nitrate of silver

prickle-cell layer occurs as the result of an irritation, which is not sufficient to cause either a degeneration or a malignant proliferation. The basal layer of the epidermis remains intact and forms a limiting layer to the proliferating epidermis. The cells immediately above the basal layer—the so-called daughter cells—no longer become differentiated but assume the function of the basal layer and proliferate. True hypertrophies of this layer (daughter cells) are generally circumscribed and result in the formation of benign new

¹ *Brit. Jour. of Derm. and Syph.*, Dec. 1932 p. 584

growths, such as . . . warts. . . . Formerly it was customary to include such affections under the heading of 'papillomata,' but there is a tendency now to abandon the term as it is somewhat of a misnomer. . . . Auspitz has applied to the true hypertrophies of the prickle-cell layer the name 'hyperacanthomata' Unna has followed Auspitz's example, and has employed the term 'acanthomata' for the benign epidermal tumours and 'acanthosis' for any proliferation of the prickle-cell layer in which the fibrillary structure of the cell is retained" ¹

From all these opinions it may safely be said that there is still a good deal of research to be done in this subject, and the chiropodist has wide opportunities for observation of actual cases. Summing up what is already known we see that the origin of verrucæ is associated with a mild trauma with or without virus invasion. Multiple verrucæ may have a virus infection following on a slight puncture trauma, but a single verruca may be due to bruising without an actual break in the skin.

Treatment.—There are several recognised methods of treatment, all of which have their own advocates.

1. Surgical excision.
2. Diathermy.
3. Electrocautery
4. Refrigeration
5. X-ray or radium therapy.
6. Constitutional therapy.
7. Local chemical therapy.

1 **Surgical Treatment** by excision is outwith the scope of this volume. In the case of single verruca it is employed with success. With multiple verruca, however, and when the site is on a weight-bearing surface, and when the use of even one suture is necessitated, the resultant scar is a source of irritation and a corn of a painful and intractable type frequently results.

2 **Diathermy**, either high-frequency diathermy or the diathermy needle, is in skilled hands a useful method of treatment, and is used with a local or general anæsthetic according to the individual case.

¹ "Pathology of the Skin," pp. 90, 91.

3 Electrocautery may be used instead of diathermy. It is liable to leave a scar. This from an æsthetic point of view is not important on the foot but if it is extensive it may result in a corn as in the case of excision.

4 Refrigeration.—Carbon dioxide snow is a favourite treatment with some practitioners. Special apparatus, suitable for surgery practice has been introduced which freezes



FIG. 33

Shows the irregular distribution of verruca on the feet of a boy of 12 years.

and compresses the carbon dioxide into a pencil shape. This is held firmly against the verruca for about a minute until the excessively low temperature of the chemical causes the verruca to freeze. A sterile dressing should then be applied and a protective pad if necessary. The patient is told to return in a week or ten days, when some sloughing should have taken place. If the verruca has not been completely destroyed another application should be given.

The operator must exercise great care in handling the carbon dioxide pencil as it will 'burn' his fingers badly if they are not protected by gloves.

When the whole of the unhealthy growth has been destroyed the resultant ulcer must be washed out with hydrogen peroxide and dressed with some stimulating preparation such as tinct. benz. co.

The end result of this treatment is usually a soft white scar which is scarcely noticeable.

5. X-ray or Radium Therapy.—This must be undertaken by trained personnel with adequate precautions, and it is better if the skin has not already been treated locally by chemicals.

6. Constitutional Treatment is often very successful, especially in multiple verrucae in children, but this can only be undertaken by a doctor. In quickly growing children multiple verrucae sometimes occur on the feet or the knees. This is stated by some physicians to be associated with a deficiency of lime in the system. It is claimed that the administration of lime internally effects a cure.

7. Local Chemical Treatment.—The aim of the chiropodist is to bring about a state of coagulation necrosis, that is, the death of the growth due to a process of coagulating or clotting of the tissues

The patient may have been making some amateur efforts to cure the trouble, hence at the first visit there may be uncertainty of diagnosis. If a dressing of silver nitrate (*i.e.*, 50 per cent solution in water, or application with fused stick) be applied, a characteristic reaction will take place within two or three days, thus enabling a correct opinion to be formed. On the second visit the blackened eschar should be removed and underneath, in the case of a true verruca, there will be found a whitish area with black specks. This area will be defined by a line of demarcation within which the striæ of the skin will be definitely interrupted. The silver nitrate has combined with the albumin of the tissues to give the characteristic “bleached” appearance, and the black dots are the necrosed ends of the papillæ. It is *very rarely* that this diagnostic method is required, as an experienced chiropodist finds it unnecessary and a waste of time.

The chemical agent used in treatment may be either (1) alkali or (2) acid.

1 Alkaline Treatment.—Caustic soda (sodium hydroxide) or caustic potash (potassium hydroxide) are dispensed in “pencil” form. They are deliquesced by exposure to air or by the addition of a drop or two of water. The foot should be carefully prepared by surrounding the verruca exactly with a ring of vaseline or silver nitrate. This is to protect the



FIG 34

This case of multiple verruca was treated once with pyrogallie acid and then the photograph was taken after one layer of epidermis had been removed. On looking closely into the denuded portions the "honey comb" formation is apparent.

surrounding tissues from any overflow. Then a wooden applicator should be thoroughly moistened in the caustic and well worked into the growth two or three times taking care to reach all the surface of the verruca. After three or four minutes if the patient complains of pain, it may be

neutralised with dilute acetic acid and a suitable pad and dressing applied (see Chapter Ten on Padding). This treatment may be repeated twice weekly, and three or four applications may be sufficient to bring about a reaction. The reaction may be characterised by a serous exudate which takes place after the underlying healthy tissue has been irritated. At the same time the whole of the verruca breaks down and can be cleared away, leaving a healthy granulating surface. This must be carefully protected from infection, washed with hydrogen peroxide, and a stimulating dressing applied. Tinct benz co. is very suitable or 10 per cent. ichthyol in glycerine if there is much inflammation. If there is much discharge the patient should return for further dressing in one or two days, when a *very careful* examination should be made to ensure that the verruca is entirely gone. There may be some slight portions still remaining at the edges and they should be further treated. The completeness of the cure is evident when the striæ of the skin are re-established. In any case it is safe to ask the patient to return for examination in a month's time, when no signs ought to be showing.

2. Acid Treatment.—Acid may be applied, either liquid or in ointment form or as plasters. Slowly acting acids are best used as ointments, as they are thus kept longer in active contact with the verruca. The most commonly used acids are—

Monochloracetic	Liquid
Trichloracetic	Liquid, fairly safe for patient's home use daily
Formaldehyde (40 per cent)	Liquid, useful for a stubborn case
Salicylic (50 to 75 per cent)	Ointment
Pyrogallie (40 or 50 per cent)	„
Nitric concentrated	Liquid
Silver nitrate	Fused stick

In using any ointment the procedure is as follows. Take a circle of thin adhesive, cut a hole in it exactly corresponding to the verruca, and fix it in position. With an applicator apply evenly to the part (through the aperture) the required quantity of ointment. Cover it all in with adhesive strapping and fix a protective pad if necessary. The patient may return twice weekly, but it is usually better to have only weekly visits as the acid has a cumulative action. On these subsequent

visits as much of the growth should be cleared as possible (with antiseptic precautions, see Chapter Twelve) and a further application of ointment made. As with the alkali there may be reaction with serous exudate when dressing with hydrogen peroxide and tinct. benz. co. is suitable.

When liquid acid is used—such as *Monochloroacetic*—the surrounding area must be carefully protected from any overflow. Plaster should not be used for this purpose as it absorbs the acid readily, but a pencil of silver nitrate may be rubbed round the area and then the acid should be thoroughly worked in with an applicator after scarifying the growth. It should be covered in with adhesive plaster and remain undisturbed for a week or ten days. Then a little of the growth may be removed and a further application of acid made. One to three applications are usually sufficient to effect a cure.

If the cavity has been cleared out and a little of the verruca still remains it is very necessary to protect the exposed under layer from further application of acid.

This can be done by painting with silver nitrate (5 per cent. solution in water).

As with other agents the final treatment should be some stimulating dressing to hasten healthy granulation.

Chiropodists will probably have to purchase monochloroacetic in crystals. These deliquesce on exposure to air, but it is useful to know that good results have followed one small crystal placed in the centre of a large moist verruca and carefully covered with adhesive plaster.

When a patient cannot visit a chiropodist at frequent intervals it is useful to give 'dots' of plaster impregnated with *pyrogallie* or *salicylic*. These can be placed over the



FIG. 35

Shows a curious example of a verruca which developed in connection with an ordinary hard corn. The greater part of the latter was removed with tissue nippers and the verruca treated with 75 per cent. salicylic in lanoline. It cleared away unevenly.

verruca, held in place with adhesive, and changed twice weekly. They are slow-acting but are sufficient to keep the verruca in check

Trichloroacetic can also be used at home and worked in with an orange stick daily by the patient

Nitric Acid can be used full strength daily, and when the author first became a chiropodist it was customary to let the patient do this at home; but accidents sometimes happened owing to careless handling of the bottle

A *silver-nitrate* stick—lunar caustic—was an old-time remedy. “Cut the wart till it bleeds and then rub in the caustic” were the instructions. But it is a slow process. The silver stick is useful, however, in diagnosing and also in finishing a doubtful case

Formalin (formaldehyde, 40 per cent) is a favourite standby for those perplexing cases which sometimes crop up, which go on and on for months and even years, apparently defying every sort of treatment—surgical and electric. Probably no one of these methods was carried on to a complete cure, and the verruca developed immunity

Formalin is very slow but sure, and the patient can use it safely at home. If it is allowed to overflow on to healthy tissue it will do no harm the first time or the second, except to dry up and harden the epidermis. By about the fourth time of overflow, however, the epidermis may crack and the patient realises this by the sharp sting which follows the next application. He then must wait for three days before using any more formalin, and is more careful thereafter. The author has not known of any unfortunate sequelæ

Recently Sydney Thompson has recommended the use of 3 per cent formalin for plantar warts. The wart-bearing area is soaked every night for ten minutes in a saucer containing this solution; after three to four weeks the wart may be readily removed in about 60 per cent of cases

Formalin is liable to cause a contact dermatitis in a small proportion of patients, so that those using it should be warned to stop its use on the first sign of irritation.

Pyrogallie is to be preferred for children's feet, as it is not so violent in its action and with delicate skins gives quite satisfactory results.

Salicylic is a very useful everyday remedy and is possibly the one in most common use. In its action it appears to disintegrate the growth more than other drugs so that at each visit it is possible to remove more dead tissue. As the density of the verruca becomes less care must be taken to reduce in amount rather than in strength the application of the acid.

The last application of any of the foregoing may penetrate the whole of the growth and reach the underlying tissue. It is this that produces the apparent suppuration and pain but long experience will enable a chiropodist to gauge to a nicety just how much to apply. In the writer's practice pain and suppuration are the exception rather than the rule. These acid treatments should for the most part be painless as long as the acid is absolutely confined to the verruca but there are occasionally patients who complain of acute pain after each application. This is possibly due to an idiosyncrasy on the part of the patient and the agent should be changed at once.

Should there be excessive and prolonged pain at any time during the treatment the treatment should be discontinued for a day or two and antiphlogistic remedies applied such as kaolin poultice or hot borie soaks or ichthylol and glycerine. Then the treatment should be changed.

On the other hand there is the patient occasionally met with who is hypersensitive and cannot tolerate any acid treatment. For such cases a reference to a surgeon or a radiologist is advisable.

When verruca occurs on a weight bearing part it will be necessary to use a protective pad until the pain has eased off.

The final result of acid or alkali treatment is the complete restoration of normal epidermis. When the striae of the skin have reappeared without a break the case is cured.

Multiple verrucae often yield to a most simple treatment. Where the case is a satellite group if the large verruca alone is treated with salicylic acid it will be found that the satellites usually disappear at the same time.

If there is a large number of verrucae—perhaps twenty or more—scattered over the plantar surface they often yield to persistent dressing with magnesium sulphate. This may

be either a saturated solution in water applied as a soak, or a daily application of a paste in glycerine.



FIG 36

The patient—a middle-aged man—came for treatment complaining of pain in the heel. The only objective symptom was a slight redness round the edge. The part was painted with tinct. benz. co., a cushion pad of $\frac{1}{8}$ -in. felt placed on the plantar surface to lift the heel in the shoe and the whole covered in with zinc oxide and rubber plaster. Overnight the pain became intense, but subsided in a few hours. When the dressing was removed in five days the appearance was as shown in the plate. The part was again painted with tinct. benz. co. and covered in with plaster but no pad. This treatment was reapplied five times and each time the plaster was removed several small verrucae were found adhering to it, leaving healthy granulating surfaces beneath them. The case was dismissed cured in six weeks. Note the reappearance of the striae of the skin at the base of the lesions.

The case illustrated in Fig. 36 showed more than fifty verrucae at one time, yet they cleared away after application of tinct. benz. co. followed by close application of rubber

adhesive plaster. When this was removed the verrucae were found adhering to the plaster.



FIG. 37

Verruca in unusual position on hallux

Fig. 37 shows a verruca in an unusual place on the toe of a child aged 4.

HYPERKERATOSIS

HYPERKERATOSIS is a condition in which the epidermis is excessively keratinised. The skin is thick and rough and often fissured.

Etiology—(1) It is sometimes associated with anidrosis (see p. 51) and in this case the fissures will probably occur in winter and tend to heal in summer. (2) There are different systemic diseases in which it is a feature and it is sometimes syphilitic in origin. (3) It may be hereditary or familial.

Treatment.—With anidrosis the fissures are generally superficial but if neglected may easily become raw and infected (see p. 82). Hyperkeratosis is much assisted by applications of Epsom salts paste or by merely covering in with adhesive stockinet plaster. If the fissures are deep and raw the edges may be touched with silver nitrate pencil before covering with plaster. The simplest treatment is to wear stockings knitted with raw only wool. Figs. 38 and 39 show this type of hyperkeratosis with fissures.

When of syphilitic origin there may be an extreme degree of keratinisation and the patient must be under medical supervision. Locally salicylic ointment (10 per cent.) is useful to bring about a thorough exfoliation of the epidermis.

All cases of hyperkeratosis should have the benefit of medical advice so that the underlying disease, if any, may be treated without delay (see Fig. 14)

FISSURE

A FISSURE is a deep crack in the epidermis which is slow to heal. The commonest situations in the foot are between the toes or round the edge of the heel.

Fissures are commonly associated with "athlete's foot" when between the toes, and with either excessively moist



Fig. 38

A common type of fissure which appears in winter

or excessively dry skin or with hyperkeratosis when situated round the heel. They are also found more frequently in winter than in summer. They should be treated with silver nitrate. If there is much calloused skin this should be removed with a scalpel. If the part is raw, silver nitrate (5 to 15 per cent.) ointment should be applied and the whole covered in with elastic plaster. If the part is not raw, the silver pencil may be firmly rubbed in before applying the plaster. Alternative treatment might be with magnesium sulphate paste or, in a case with inflammation, a pack of ichthylol or iodine ointment.

Fig. 38 with the enlargement 39 shows a very common type which is liable to occur in winter and is often due to

dryness of the skin. The particular case shown was treated with magnesium sulphate paste. It made an uneventful recovery.

Fig. 40 shows pronounced varicose condition with skin pigmentation and scars of old ulcers. When first under



FIG. 39

Enlargement of Fig. 38

observation there was considerable serous exudate from the fissure and it had the appearance of malignant epithelioma. On medical advice it was treated with acriflavine emulsion for four weeks. This was sufficient to close the fissure. The following treatment was 5 per cent salicylic acid in T.C.P. ointment fortnightly. After six months the result was very



FIG. 40

Fissures with varicose complications.



FIG. 41

The result of four months' treatment of the foot shown in Fig. 40



FIG. 42

Fissure which resulted from a burn followed by severe ulceration



FIG. 43

Hyperkeratosis with fissure

favourable. In between treatments the patient soaked the feet well with green soap and rubbed off the dead tissue

Fig 41 shows the same foot four months later

Fig 42 shows an interesting case. The patient had received a severe burn from a hot water bottle while under general anaesthesia. The ulcer resulting from the burn kept her in bed for years. After fifteen years it was as shown in the photograph completely healed except for the persistent fissure. This was treated with acriflavine emulsion with a protective V pad of soft felt and a metatarsal bar of compressed felt. A favourable result followed.

Fig 43 shows another case of hyperkeratosis and fissure with an unusual distribution. It was probably aggravated by short shoes which caused hallux rigidus in the right foot.

SYPHILIS

The treatment of syphilis must of necessity be undertaken by the medical man, but it is important that the chiropodist should be able to recognise it. The disease may easily be contracted from a patient infected with it. The type most commonly found in the foot is a papulo squamous variety with the lesions in a somewhat symmetrical arrangement.



FIG 41

Feet of a child of 3 years. Note the metatarso-phalangeal area with flat blisters with dirty grey & scales also the ulcers at heels

Fig 44 shows the feet of a child of 8 years where the doctor suspected congenital syphilis. Unfortunately the mother did not take the advice given—that was to take the child to hospital for fuller investigation.

A microscopic search for the organism and serological examination are the only satisfactory methods of determining the presence of the disease, but the chiropodist should be suspicious of feet showing large flat blisters covered with thin, scanty, dirty-greyish scales as in the illustration. Medical advice should be sought at once.

The patient shown in Fig. 44 returned to the foot clinic some twelve years later. The plantar surface of both feet were then entirely covered with extreme hyperkeratosis. Again the patient did not return for further investigation and treatment (see also Fig. 81).

MOLES

PIGMENTED MOLES are sometimes observed on the feet and are generally congenital, though they may be acquired in later life. Sometimes they are flat and level with the skin and sometimes they are slightly raised.

The chiropodist should leave them *entirely* alone as they are apt to assume malignant features if irritated. If the patient is unfortunate enough to have a mole in proximity to a corn or in a nail area, then the greatest care must be taken not to injure the mole. If moles do become malignant they are the most rapidly spreading and most malignant of all cancers.

PERSPIRATION ABNORMALITIES

Perspiration is a natural function and is partly instrumental in keeping the heat of the body at a healthy uniformity. It also is a means of eliminating waste matter from the system. It is directly controlled by the autonomic nervous system and its related hormones. Irregularity of this function comes within the practice of the medical practitioner.

Excessive perspiration is known as **hyperidrosis**. When there is much decomposition of fatty acids, etc., between the toes in conjunction with *bacterium fetidum*, there is foul-smelling perspiration which is called **bromidrosis**. The chiropodist will readily notice if there is evidence of either condition.

Occurrence—It is often a common occurrence in cases of general debility. Young children who are growing rapidly

or patients recovering from some weakening illness may suffer from excessive perspiration. In such cases the condition is probably due to stimulation of the nerves which have been subjected to a congestive irritation owing to the inflammation arising from foot strain or other arch trouble. When hyperidrosis is due to debility or overwork a very speedy improvement is sometimes produced by strapping as for a weak foot (see Chapter Ten). Anyone who has long hours of standing in tight shoes or rubber may have very offensive feet in spite of meticulous cleanliness. Over bathing of the feet, especially in very hot water, produces a relaxed condition of the skin which often simulates hyperidrosis.

Certain medical conditions such as kidney disease or specific nerve affections will also produce excessive perspiration. Faulty assimilation of food may affect sweat production.

Treatment—It is always dangerous to check perspiration abruptly, and severe remedies should not be adopted unless under medical advice.

Absolute cleanliness is essential, yet over soaking the feet is to be avoided. Potassium permanganate may be added to a foot bath until the water is a pale pink. This has a tonic effect on the skin.

An astringent lotion of 3 per cent salicylic acid in spirit may be sponged on the feet.

An astringent powder of salicylic (3 parts) starch powder (10 parts) and talcum (87 parts) may be dusted on feet and into socks.

Other remedies are to be found in Chapter Twelve.

When the skin is sodden with perspiration and resists all these simple treatments, further medical advice should be sought.

Anidrosis is the opposite of hyperidrosis i.e. absence of perspiration. In the feet this sometimes gives rise to fissuring at the heel or milium cysts.

Its cause is obscure—sometimes it may be due to faulty innervation. It also happens after a sympathectomy for Raynaud's disease.

Alleviation may be secured by rubbing in ointments such as lanoline. Suitable cases where hyperkeratosis or fissures are present may be treated for several days at a time with closely adhering adhesive plaster.

CHAPTER THREE

CONDITIONS AFFECTING TOE-NAILS

THE following will be considered .—

Subungual Corn.	Paronychia.
Subungual Exostosis.	Onychocryptosis.
Involuted Nail.	Onychorrhaxis.
Sensitive Sulcus.	Onychatrophia.
Onychophosis.	Onychomadesis.
Onychauxis.	Onychoptosis.
Onychogryposis.	Sunk Nail-bed.
Onychia.	Onychomycosis.

NAILS

THE NAIL is an appendage of the skin and consists of hornified epidermal cells. It arises from the matrix which lies proximal to the white crescent at the root of the nail. Should any accident happen to the matrix it will cause an alteration in the growth of the nail. The matrix is quite indistinguishable by the naked eye from the surrounding skin cells, and this accounts for the difficulty experienced in surgical operations which aim at destroying part of it in cases of ingrown nail.

NAILS were intended to serve some useful purpose to their owners—either to protect the nerve endings, to be used as instruments or weapons, or to form a firm backing to the tip of the toe or the finger, thus allowing very small articles to be picked up. They should be cut to the shape of the toes and should on no account be too short. If the corners are shorter than the toes, then the epidermis is pushed over the edge of the nail by the footwear and an “ingrown nail” will probably develop. If the corners are left too long the possibility is that the nail may become involuted.

If NAIL AFFECTIONS were to be classified according to their causes they would fall into four main groups. These are —

- Traumatic Causes
- Nutritional Deficiency Causes
- Infective Causes
- Familial Causes

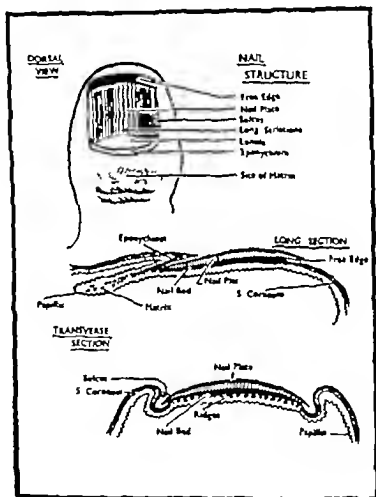


FIG. 45

Diagram of nail structures.

In actual practice however it will usually be found that similar results in different cases may have different causes and the same cause may have different results in different individuals.

Nail conditions form a very important branch of skin diseases and many of them can only be treated by a dermatologist, so that the student is referred to textbooks on dermatology for a full treatment of the subject. Only such cases as the chiropodist encounters frequently are discussed here.



FIG 40

Shows a great toe-nail which has been partly cut back to allow removal of a hard corn. Note how the pressure at the toe tip which caused the corn has also been responsible for forcing the first metatarsal head towards the median line of the body, thus allowing a hallux valgus to develop. The four smaller toes are also contracted with hard corns at the proximal joints.

SUBUNGUAL CORN

SUBUNGUAL CORN and SUBUNGUAL EXOSTOSIS are sometimes mistaken the one for the other. The former is of very common occurrence and the latter is by no means rare.

SUBUNGUAL CORN is an ordinary hard corn which has developed under the nail as the result of some slight trauma.

It may occur anywhere on the nail bed and is generally caused by the pressure of the distal phalanx against the short shoe or by the pressure caused when one toe overrides another. As the horny layers of the corn increase, the nail plate becomes detached from the nail bed and the pink colour is changed into a putty like appearance. Occasionally a minute black speck shows through the nail—this is due to extravasation of blood. When the nail is pressed a slight yielding is felt objectively—this is an important diagnostic point, distinguishing corn from exostosis.

Treatment—It will probably be necessary to cut away a little of the nail from the free edge backwards, removing as

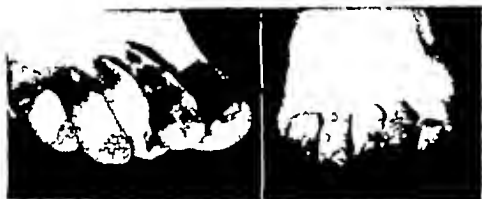


FIG. 47

FIG. 48

Figs. 47 and 48 show two aspects of another great toe with subungual corn before and after enucleation. Notice the dorsiflexion of hallux.

little as possible. It will then be found possible to enucleate the corn in the usual way (see p. 28). As an after-dressing the silver nitrate pencil may be used—lightly if the part appears tender, strongly if much of the growth remains. This will have the effect of causing a protecting eschar to form which takes the place of the nail which has been removed. The toe should then be enclosed in a cocoon of gauze or wool or stockinet (see pp. 149-152). The treatment should be repeated weekly if necessary.

In a condition of this sort it will usually be observed that the terminal phalanx is dorsiflexed in the case of the great toe. This must be corrected if the cure is to be permanent. The easiest way of course would be to place a felt pad over

the terminal phalanx, and in cases with acute inflammation this is done for a day or two till the acuteness has subsided. But a continuance of the pad in this position would probably lead to injury of the matrix. An alternative treatment is to place a blunt wedge of felt *under* the interphalangeal joint, or bring a "tension" strip of plaster from the plantar tip tightly back to the head of the metatarsal.

When the corn occurs under the nail of one of the smaller toes the distal phalanx is usually plantar flexed, and an adhesive plantar prop should be used to straighten the toe for the first few weeks of treatment. Afterwards it may be necessary for the patient to wear a replaceable cap of stockinet with a suitable pad attached (see p. 153)

In all these cases it is imperative that shoes and socks of suitable length be worn.

SUBUNGUAL EXOSTOSIS

SUBUNGUAL EXOSTOSIS.—This also is the result of trauma frequently from a short shoe, probably, though not necessarily.

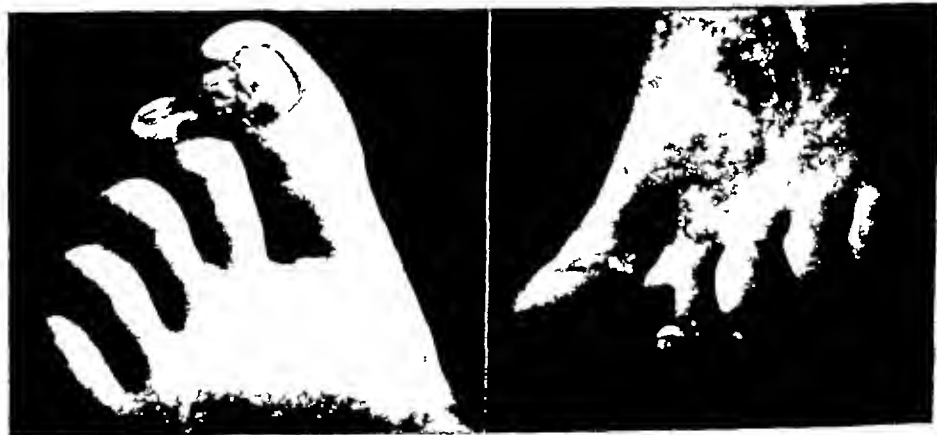


FIG 49

FIG 50

Figs. 49 and 50 show two aspects of a case of subungual exostosis (which was removed surgically) in a girl aged 14 years.

aggravated by a high heel. In this case the injury is to the periosteum and a small outgrowth of bone has followed. The epidermis is usually very thin over this exostosis, so that the colour is bright red. The author has seen cases which

were encapsulated outwardly and this gave a putty like colour instead of bright red. As the growth increases it is frequently pushed out beyond the toe. The nail adheres closely to it and upon pressure always offers a hard resistance objectively. These two features, bright colour and hard resistance distinguish it from a corn. In addition there is often a distinct line of demarcation associated with the exostosis.

An X ray examination should be made to confirm the diagnosis and the treatment is usually surgical excision of the exostosis. If correct footwear is adopted after the excision a permanent cure will be the result but if unsuitable shoes are persisted in, the condition will recur. For this reason some surgeons remove the whole of the terminal phalanx.



FIG 51

X ray of Fig 49

The chiropodist has the opportunity of tackling patients



FIG 52



FIG 53

Figs. 52 and 53 show a case of subungual exostosis in a female aged 22

who absolutely refuse surgical help. There is the history of several in private practice, some of whom consented to an

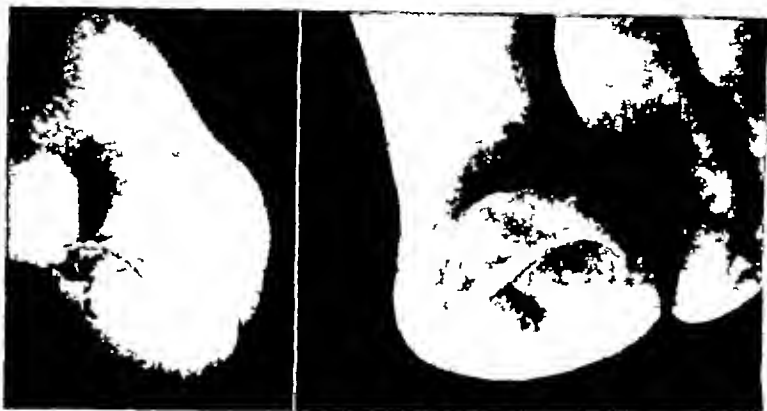


FIG 54

FIG 55

Fig 54 is a case of subungual exostosis in a female aged 10

Fig 55 is a case of subungual exostosis in a female aged 30

X-ray photograph being made, others refused even this, but the diagnosis was clear as the cases were pronounced. They all became symptom-free in two or three years by the mere removal of unnatural pressure. They had their footwear supervised and the toe padded by way of protection; they also had a prescription of 10 minims formaldehyde (10 per cent) to 1 oz sodium bicarbonate, with sufficient glycerole of starch to form a thin ointment. This was applied daily and was useful psychologically if not physiologically.

INVOLUTED NAIL



FIG 56

Shows a very ordinary type of involuted great toe-nail

INVOLUTED NAIL is a nail of which the lateral edges are turned in towards the nail bed. Sometimes the curve is very slight sometimes it is so extreme that the two sides almost meet. Both edges may be involved or only one.



FIG. 57

Shows a foot of which the nails would easily become ingrown if they were cut away at the corners. When the patient was first seen the great toe nail projected 1 in. beyond the tip of the toe. It formed a complete tube. If the plate is carefully examined it will be noticed that the lateral edges of the nail are overlapping with a layer of normal skin tissue between them. At first it was thought this was a case of subungual exostosis.

Etiology—Sometimes this is the congenital shape of the nail and sometimes it is acquired through slight but frequent trauma. When nails are neglected and allowed to grow too long the free edge impinges on the toe-cap of the shoe. This gradually moulds the nail into the abnormal shape. When

the toe-cap is very pointed, or if there is oblique contracture of the toes, this abnormality becomes involution

An involuted nail is not necessarily painful. If it is correctly cut and correct footwear (stockings as well as shoes) is worn, though the shape may never return to normal, it should not cause any inconvenience. If nothing is done a sensitive sulcus will result, but if the corners are cut away there is every probability of onychocryptosis supervening.

Treatment — The nail should be carefully cut to the length and shape of the toe. It should be thinned if there is onychiauxis. If the sulcus is tender and inflamed it should have a very light packing with lint or cotton wool saturated with a mild astringent such as hamamelis.

SENSITIVE SULCUS

Sensitive Sulcus.—This is the result of pressure of the



FIG. 58

X-ray of Fig. 57. Note the tight-fitting boot which has caused oblique contraction of the second, third, fourth, and fifth toes.

soft tissues against the lateral edge of the nail when the nail groove is in a relaxed condition due to some debilitating illness or to over use of hot foot baths, or to undue perspiration. Frequently the patient tries to relieve the pain by cutting the nail down the side. If he leaves a rough edge a corn will form in the sulcus. If he persists in cutting away the edge the probable result will be onychocryptosis.

Treatment of sensitive sulcus is correct cutting of the nail and toning up of the sulcus with some mild astringent such as hamamelis, Burow's solution or tinct benz eo. For the first week or two it is advisable to place a thin wisp of wool between the edge of the nail and the sulcus. If a corn is present it should be removed with antiseptic precautions as outlined on pp 27, 28.

ONYCHOPHOSIS

ONYCHOPHOSIS is a condition of calloused nail groove. It is Nature's way of dealing with a sensitive sulcus. If it is painful it can easily be removed after a short soaking in 2 per cent Iodo or 10 per cent liquor potassee. If the chiropodist is using a scalpel in the sulcus he should beware of causing hæmorrhage. Any cut in this situation will readily become infected with possibly serious consequences (see Paronychia and Cellulitis pp 67-82).

ONYCHAUXIS

ONYCHAUXIS is a condition of thickened nail. Some cases are very extreme, the nail reaching a thickness of almost an inch. It is usually caused by continued pressure or



FIG 50

Shows an onychauxis which was caused by a sharp blow. Notice how the increased pressure at the tip of the toe has reacted at the base of the toe.



FIG 60

Shows two examples of onychia (great toe right foot and third toe left foot) which were due to continued friction between the toes and the toecap in a short shoe. A secondary result was the hard corn under the great toe. When this corn was removed a fair amount of serous fluid drained away and there was revealed considerable bruising of the surrounding tissues. It was dressed with T.C.P. and a crescent pad applied proximally. The corneous condition cleared in ten days. The thickened nails were reduced with nail scalpel and file, and the patient was advised about footwear.



FIG. 61



FIG. 62

Figs. 61 and 62 are two aspects of the same foot. The onychia is again due to short shoes. Observe the corns at the pressure points at the apex of the fourth toe and under the head of the first metatarsal.

a single sharp blow on the point of the toe, which injures the matrix but not so severely as to destroy it. The nail grows forward very slowly almost unperceptibly after this and growth takes place towards thickness rather than length.

Onychia may also be caused through inattention to

FIG. 63

Shows hereditary onychia in a girl of 10 years. It occurred in several members of her father's family in different generations. It is probably mesodermic in origin.



the nails. If a nail is left uncut for a long period the free edge is pressed into the toe-cap of the shoe. The nail being pressed back upon the matrix causes sufficient injury there to produce the thickening of the nail.

Some forms of fungus (e.g., *Tinea*) since they infect the



FIG. 64

Shows another familial onychia in a girl aged 3 years.

nail will also produce an extreme thickening somewhat spongy in texture.

Treatment—Whatever the cause, the chiropodist's initial treatment is the same—removal of the excessive growth by nippers or nail scalpel or by electric drill. After this the footwear should be examined to make sure that there is no undue compression. If the chiropodist suspects *tinea* he

should advise the patient to consult his medical adviser, in the meantime soaking the nail well with Friars' Balsam.

One word of caution is needed when cutting these thick nails always press the nail gently towards the nail-bed,



FIG 65



FIG 66

Figs 65 and 66 show onychia in the hand.

and never cause it to pull on the soft tissues underneath. Remember, too, there may be a neurovascular "thread" running up the centre of the nail. This should be treated with a substantial dressing of silver nitrate

ONYCHOGRYPOSIS

ONYCHOGRYPOSIS or OSILLER'S TOE is somewhat similar to onychia, the nail is thickened, but as the growth is slower at one side than the other the nail adopts a curved or ram's-horn shape. A frequent cause used to be a sharp blow from the hoof of a horse, hence its second name.

The nail is generally painful to the touch, so that the patient may have refrained from cutting it over a period of years. When this pain is present the chiropodist will probably find a deep-seated corn at the edge of the nail where the



Figs. 67 and 68



Figs. 69 and 70



Figs. 67 and 68 show two aspects of the same foot with onychogryphosis. Note how the displacement of the second toe has caused a callous development under the second metatarsal head.

Figs. 69 and 70 show the same pair of feet—those of a woman of 81 years—suffering from extreme neglect causing onychogryphosis of all the toes.

Fig. 71 is interesting because it shows the foot of a girl of 23 years whose mother's foot had exactly the same type of great toe. The latter had been treated in the presence of this daughter who thereafter attempted to attack her own with knife, scissors, and file—hence the carved appearance. The patients could give no history of injury which would cause the onychogryphosis.

growth has been retarded. If this is removed first it will be possible to cut the nail quite painlessly, then proceed as for onychiauxis.



FIG 72

Is a sample of neglected fect—ngam with onychogryposis

ONYCHIA

ONYCHIA or ONYCHITIS is inflammation of the matrix. It is always a serious condition. It may be due either to some local infection or to some systemic disease, such as tuberculosis, syphilis, or gout. If it is local in its origin then probably only one toe will be affected. If several of the toes are inflamed the patient should be advised to consult his doctor without delay, as it is probably a focal sepsis with a systemic cause.

If it is a local infection the source is probably some dirty instrument that has been used, and hot boracic soaks should be ordered at once. If the inflammation does not yield to this in twenty-four hours, medical aid should be sought.

If pus is present this should be carefully washed away with hydrogen peroxide, and after the boracic soak the part should be painted with weak solution of iodine. If iodine cannot be tolerated, acriflavine or methylene blue can be used. The part should be protected from pressure with

a suitable pad and gauze dressing whilst allowing for drainage. When the discharge of pus has ceased subsequent dressings may consist of antiseptic dusting powder with gauze

Prognosis — After a severe attack of onychia the nail may be irregular in its growth or there may be no nail—it all depends upon the degree of injury to the matrix

PARONYCHIA

PARONYCHIA is inflammation of the sulcus and all that was said of onychia refers to this also. It often follows the pricking of the true skin whilst a corn is being enucleated. It may be associated with ingrown nail (see p. 60) but it is more commonly due to septic organisms and to a yeast infection, one of the fungi. It is always a serious condition and the chiropodist will be well advised to refer it to a doctor, after dressing with weak solution iodine. Should the doctor refer it back to the chiropodist, the treatment should be on following lines —

If pus is present, hot fomentations should be carried out for twenty four hours. After this a dressing of iodoform or one dressing of strong solution of iodine will probably be sufficient to control the inflammation. A wisp of cotton wool or a few threads of gauze should be inserted as a drain. The sulcus should be well packed with iodoform or a mixture of 1 part iodoform and 6 parts boric acid powder and the whole enclosed in a cocoon dressing.

When the discharge has ceased dry dressings should be applied, but it is very important to have a slight layer of cotton wool or gauze round the lateral edge of the nail to prevent injury to the sulcus.

ONYCHOCRYPTOSIS

ONYCHOCRYPTOSIS — This is the condition of ingrown toe-nail where the lateral edge of the nail has injured the

sulcus and become embedded in the soft structures surrounding it. It frequently occurs in cases where the nails have previously been involuted. This may be the natural shape, or it may be acquired as the result of pointed footwear (see Figs 58 and 59).

Etiology.—The term “ingrown nail” is unfortunate as it suggests that the nail has grown beyond its normal limit and requires to be cut shorter. The exact opposite is the case. The nail has been cut too short and the soft structures, meeting with no opposition, have overgrown so as to fill up the sulcus. When the nail grows forward to its proper length it presses against this overgrowth and, urged by the discomfort, the patient again tries to “cut the nail out” Owing to the inflammation he cannot cut as far as previously, and leaves a splinter of nail which very soon punctures the epidermis (Fig. 73)

This injury, though slight, is always serious, as septic conditions almost invariably ensue, followed by exuberant granulation, and if correct treatment is not immediately adopted there may be circumscribed or even diffuse cellulitis. General septicæmia may result from careless treatment.

Treatment for Onychocryptosis with Simple Inflammation.—At the first visit the splinter should be located with a blunt probe and, if possible, it should be removed. This can be effected with a small pair of nippers or a nail cleaver, or a special nail scalpel with short blade and blunt point (this latter to prevent further injury to the sulcus). The splinter may be removed by working either from the free edge of the nail backwards or from the lateral edge of the nail forwards. Whichever direction is followed, the cut should be made so as to leave the lateral edge smooth and free from any suggestion of a “shoulder.” A specially designed file is sometimes useful for this. (It is perhaps necessary to remind students that antiseptic precautions are essential in dealing with such cases, and that the sulcus becomes infected after very slight provocation.)

The part should be painted with a weak solution of iodine and dressed with some astringent such as hamamelis, or alum exsiccatum, or aluminium acetate. The most

important part of the dressing is a wedge of cotton wool to fill up the sulcus and force the soft tissues back into their proper place until the nail grows to its correct length again. This may take several months, and the chiropodist should be the only one to cut the nail during that period. A drop or two of tinct. benz. co. is very useful in keeping the cotton wool in place. Be careful that the 'wedge' is not large enough to force the nail away from the bed.

To prevent recurrence the patient should be taught to cut the nails slightly concave rather than 'cutting away the corners'. Some patients have an idea that to prevent

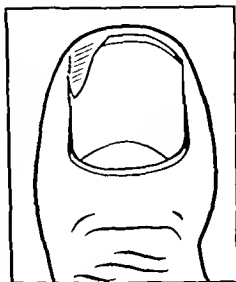


FIG. 73

Diagram of the development of ingrown nail

ingrowing a nail should be kept thin on the top with a file or piece of glass. This is always undesirable as it generally ends in the nail splitting up the centre, which gives rise to a very intractable condition at the distal end of the toe. If there is a thick ridge at the point of involution this should be thinned down.

It is better to persuade the patient that a nail *cannot* grow in if the corners are allowed to grow to the edge of the toe. This may result in a sensitive sulcus if the footwear is unsuitable. That has already been dealt with on p. 60.

Treatment for Onychocryptosis with Septic Complications and Exuberant Granulation—The treatment should follow the main lines of that already described but drainage must be established for the pus, and astringents such as alum should not be used until the pus has cleared.

The nail splinter should be removed as soon as possible as it is the disturbing centre and cause of the inflammation, and every day's delay aggravates the condition.

It may not be possible to remove it on the first visit, however, and the chiropodist's attention must be directed



Figs 74 and 75

Figs 74 and 75 show the feet of a child aged 2½ years. On medical examination she was found to have congenital dislocation of both hips. The consequent malposition of the feet caused the soft skin tissues to be pushed over the inner edge of the great toe-nails.

Note the undeveloped condition of the nail-plates

to relieving pain and controlling the inflammation and pus.



FIG 76

Shows onychocryptosis with exuberant granulation

If it is discharging freely it is usually possible to remove the splinter that day. If it is not discharging freely it should be painted thoroughly inside the sulcus and round the toe with strong solution iodine and packed with boric gauze and iodoform so as to open up the sulcus and allow

greater freedom in reaching the splinter on the subsequent visit next day.

There should be a protective pad put in position to relieve

any pressure and it will probably be found advisable to cut the shoe

When there is exuberant granulation this must be got rid of speedily or it may become covered with epidermis and appear normal. A heavy dressing with silver nitrate pencil or bluestone is usually sufficient to effect this, and the packing should be very firm in the sulcus so as to restrict the circula-



FIG 77

Shows an unfortunate result after surgical excision of ingrown nail. In the left foot the scars left by the incisions are quite distinct, running down almost to the joint, yet a small portion of the matrix was left, sufficient to allow the nail to reappear.

tion. The silver pencil should be rubbed freely on the exuberant tissue and the resulting eschar removed as soon as possible—possibly in two days. Another one or two dressings of silver should be given if necessary. An alternative treatment is to apply pure phenol to the exuberant growth. This is a favourite dressing as it acts as an anæsthetic and enables the splinter to be reached immediately but since it can also cause gangrene it should be neutralised with alcohol after a minute.

In dealing with onychocryptosis it is well to remember that there may be one or two or even three splinters, and the chiropodist should not be satisfied until the patient has had several consecutive weeks' comfort.



FIG 78

Shows another end result of the surgical excision of onychocryptosis



FIG 79

Shows the first and second toes which were accidentally crushed and the tip of each was removed surgically. Unfortunately the flap of skin used to cover the point of the toe contained part of the matrix, and the nails grew as in the picture.

Cases are on record where a splinter has been attended to by the victim himself for over a year. One such grew parallel with the nail proper. It was never removed bodily but only 'chiselled' from time to time, with the result that a sinus was formed and the splinter eventually appeared at the apex of the toe never apparently having caused excessive discomfort.

In another case reported, the splinter was so well hidden that it grew towards the bone eventually impinging on the periosteum where it did serious damage. It was removed by a surgeon.

ONYCHORRHEXIS

ONYCHORRHEXIS or brittle nail is usually due to some constitutional trouble such as anæmia or rheumatism (though the writer has personally come across nails that were polished with such enthusiasm that they were rubbed thin and became brittle). The case should be in the doctor's care for constitutional treatment, and the chiropodist's part is to keep the nails cut in such a way that they will not pierce the epidermis.

ONYCHATROPHIA, ONYCHOMADESIS, AND ONYCHOPTOSIS

ONYCHATROPHIA is a retardation of the growth of the nail which may give rise to onychomadesis or onychoptosis, which is shedding of the nails. This onychatrophia follows a debilitating illness, or any nerve trouble or anæmia may cause it. Again this is a physician's case.

SUNK NAIL-BED

SUNK NAIL BED is a curious condition in which the nail is deeply embedded in the toe with apparently no free edge. The nail evidently has been kept very short and the soft tissues at the point of the toe have piled up and overgrown the free edge. It has been seen also on hands when the finger tips and nails were being constantly worried by the

teeth. In anæmic subjects the nail-bed may be relaxed because of under-nourishment. This has sometimes allowed the nail-plate to sink.

The over-grown skin is usually fairly callous and it is not very difficult to remove it, using an escharotic like silver



FIG 80

Shows a case of sunk nail-bed. In this patient it occurred only in the great toes, which suggests that it was due to cutting the nails too short and wearing short footwear.

nitrate if necessary. It is difficult to cultivate sufficient length of nail, so that the condition is generally recurrent in the feet.

ONYCHOMYCOSIS

ONYCHOMYCOSIS is a fungoid condition of the nail and should be under the care of a dermatologist. In appearance the nail is very thick and looks spongy, though it is hard and dry. The fungus is readily communicated from



FIG 81

Shows onychomycosis. The same feet as shown in Fig 44.

one person to another, so that the patient should be warned about towels and footwear. If he refuses to consult his doctor, then as much of the nail should be removed as can be taken away without pain, and the whole tip of the toe well soaked with Friars' Balsam every day.

CHAPTER FOUR

INFLAMMATORY CONDITIONS

FOR information on this subject the student must refer to a textbook of surgery, but a summary is given here. The following will be considered —

Inflammation	Sinus	Synovitis
Ulcer	Cellulitis	Tenosynovitis
Abscess	Septicæmia.	Bursitis

INFLAMMATION is the series of changes which follow some injury to the tissues, provided that the injury is not so severe as to cause necrosis (death of the tissue)

Etiology — It may be caused by microbe mechanical chemical or thermal irritation following some local trauma or it may be the result of a septic focus in a distant part of the body

Pathology — The process of inflammation is as follows —

- 1 There is a dilatation of the capillaries of the part with, therefore, increased blood flow giving rise to heat and redness. The blood gradually slows down and finally almost stagnates, thus leading to 2 and 3
- 2 The leucocytes migrate out of the blood stream into the tissues. There are two big classes of leucocytes *microphages* and *macrophages*
- 3 The blood serum exudes into the tissues with consequent distension in them giving rise to swelling and pain

The situation in the tissues is now as follows. The microphages are attracted by chemotaxis to the micro-organisms, which they proceed to eat and ingest. The macrophages are followed by the macrophages which are larger cells (hence their name) and whose function is to eat the dead material resulting from the struggle between the microphages and the micro-organisms. They also eat up small foreign bodies, e.g. a thorn

If the bacterial virulence is low and the body's resistance is high, this process will be successful ; but should the bacterial virulence be high, or the body's resistance be low, many leucocytes will be killed. When they die they liquefy themselves and the surrounding dead material, thus constituting pus. Pus, therefore, contains dead leucocytes, micro-organisms, and products of broken-down tissue. If the bacterial invasion is overcome the pus will be removed by natural channels. New tissues will then develop from beneath, and from the sides. This is known as the *Resolution of Inflammation*.

Sometimes, however, there is a wide area affected, such as when there is a large cut, or when the microbes are very virulent and spread, so that much tissue is destroyed. Then the inflammation does not terminate by *Resolution* but *Organisation*. This means that new strands of fibrous connective tissue, followed by new capillaries, grow into the inflamed area. The normal epidermis is not replaced but new epithelium (lacking, however, in sweat glands, hair follicles, and specialised sense receptors) grows over the top. Later this new tissue contracts and so a *scar* is formed.

Should much of the surface be destroyed by the original trauma and the body's resistance be poor, the epithelium may not grow over and so an open wound is left. This is called a chronic ulcer and the patient should be advised to consult his doctor, as it may be a dangerous condition (see also p. 81).

Signs.—The cardinal signs of inflammation are —

Heat. Redness. Swelling. Pain. Impaired Function.

Acute inflammation is bright red and all the signs are distinctly present. When pressure is applied for a moment the part blanches, and on release of pressure there is a rapid return of colour. This shows that the circulation is still active, and the condition is *active hyperæmia*. This active hyperæmia must be distinguished from the condition of *passive hyperæmia* or *congestion*, in which the part is bluish-purple in colour, and after momentary pressure there is very slow return of colour. This indicates that the circulation is retarded, and may be a danger sign especially in old age.

ULCERS

ULCERS properly belong to the domain of the medical man, by whom alone the treatment of non simple cases should be undertaken. But it is of prime importance that the chiropodist should readily recognise the distinguishing features of each type of ulcer so that he may not ignorantly or negligently attempt to treat cases which are outwith his province.

An ulcer is a break in the surface of the skin with the development of pus. As far as chiropody is concerned, an ulcer may be (a) Simple or (b) Non simple.

(a) SIMPLE ULCER is of traumatic origin. It is quite superficial and is the result of an injury or burn which has become infected with micro-organisms. Under favourable conditions, in a healthy subject suitable treatment should lead readily to healing. In the foot simple ulcers are commonly met with —

- 1 In connection with a corn which has been cut to the effusion of blood and become infected
- 2 Where a badly fitting shoe has caused a blister which has broken and become infected
- 3 Following a puncture wound of the sole of the foot from a rusty nail or spike

The treatment consists in —

- (a) Cleansing the ulcer
- (b) Removing any foreign bodies and devitalised tissue
- (c) Applying a wet antiseptic dressing e.g., Acriflavine
T.C.P.

(d) Protecting the part from further injury by a suitable pad

- (e) The ulcer should be inspected in twenty four hours. If the inflammation has begun to subside, a drying stimulating dressing should be used e.g. B.I.P.P. or Ichthvol. If the inflammation has not begun to yield or is spreading the patient should be referred to a doctor without any delay.

(b) NON SIMPLE ULCERS have an underlying systemic cause and for this reason medical supervision is always necessary. It often happens that the doctor in charge refers the patient with foot lesions to the chiropodist for dressing which he will prescribe. But it also happens that a patient may arrive without having had medical advice, and so the following notes are appended —

1. **Varicose Ulcer.**—This usually occurs in the lower third of the leg, and because of this position it is sometimes known as a “gravitation” ulcer. There is generally one large ulcer of irregular shape. The edges are not undermined and the surrounding area is bluish and pigmented. Should such a case come to the chiropodist, he should apply a pad of sterile gauze and fix it in place with a gauze or crêpe bandage and refer the patient to his doctor at once.

2 **Trophic Ulcer.**—This may arise wherever the skin has become devitalised. The immediate causes of this devitalisation are two (a) *an imperfect nerve supply*; (b) *a diminished blood supply*. These two causes are interdependent, as a poor blood supply to the part will also result in less blood reaching the nerves through the vasonervorum (blood supply

of the nerves), leading in consequence to the deterioration of these nerves. As the nerve deteriorates, so does the control of blood to the part become disorganised.

(a) *Nervous.*—There are several nerve lesions which may underlie the formation of a trophic ulcer such as tabes dorsalis, spina bifida, anterior poliomyelitis, and peripheral neuritis. Probably the last-named will most frequently be the cause of trophic ulcers which are referred to the chiropodist for treatment. There is usually very little sensation (the result of the nerve lesion), so that minor traumata which may occur will pass unnoticed until the ulcer is in an advanced



FIG 82

Ulcer due to the calcaneotalipes position consequent on anterior poliomyelitis. The disease was arrested at the age of 3 years and the ulcer developed in middle life.

state There are also those cases in which the patient walks in the calcaneotalipes position (see Fig 82)

(b) *Vascular*—A diminished blood supply will result (1) from *arteriosclerosis* most often found in the aged, (2) after the blocking of an artery by a *thrombus* or *embolus*, (3) after the slow occlusion of the vessel in *thrombo-angitis obliterans*. The damming back of the blood in varicose veins will lead to a stagnation of blood which may be associated with trophic ulcers. The transudation of serum accompanying *chilblains* will also sometimes help in the formation of a trophic ulcer.

A general systemic disease such as *diabetes mellitus* may be associated with the formation of trophic ulcers. There is a quite definite relationship between the hypercholesterolaemia of diabetes and atheroma with consequent arterial lesions, which not only help in the formation of an ulcer but render the healing of it difficult and sometimes almost impossible.

8 *Diabetic Ulcer*—This has a bluish colour and secretes a small amount of watery pus which is very foul smelling. Very often there is a considerable amount of callous skin surrounding it (see Fig 83). Because of the low vitality of

FIG 83

Shows diabetic ulcers on the tips of both great toes. A well-meaning but mistaken individual opened diabetic blisters to allow drainage. Note the amount of callous skin which formed. The toe of each shoe had to be cut away to remove all pressure and the ulcers were ultimately healed.



the skin in diabetes the chiropodist must be meticulous in all his handling of such cases where he is required to change the dressings. Conditions are most favourable for healing when the patient is kept in bed. Care must be taken that the bed-clothes do not press too heavily on the feet. No strong antiseptics can be used as they would be apt to destroy the new granulations which are very feeble. The ulcer must be 'humoured' and the type of dressing changed very

frequently as the skin becomes desensitised to any single one. This is also known as a perforating ulcer

4 Tuberculous Ulcer.—In this case the base of the ulcer is soft and very pale in colour. The edges are thin, bluish, and undermined. The floor is covered with feeble pale granulations, with a quantity of greyish sloughs. The irregular, overhanging edges are very characteristic of tuberculous ulcers. Sometimes there are brown or black encrustations. When the ulcer heals it leaves a hard corrugated scar which is liable to break down again.

5 Syphilitic Ulcer.—This has a punched-out appearance, and the edges are well defined. The base is indurated. Its colour is a coppery green and it has a rubbery consistence. The surrounding area is a dusky red with pitted scars of old sores. In view of their possibly highly infected nature, chiropodists should be on the look-out for such ulcers and send the patient to his doctor for medical treatment as soon as possible.

6. Rodent Ulcer.—This is an unusual ulcer to be found on the foot. It occurs generally in middle-aged or elderly patients and is malignant in nature. It is a tumour of the basal cell layer of the epidermis and is characterised by loss of sensation when probed. The edges are tough, calloused, and indurated, and are level with the surrounding skin. This edge should be removed and a dry sterile dressing applied and the patient referred immediately to the doctor.

When a chiropodist finds himself confronted with any of these non-simple types he should render first aid

- (1) Cleanse the ulcer with hydrogen peroxide (5 volumes).
- (2) Apply some mildly stimulating and antiseptic dressing.
- (3) Pad the part to prevent any further injury.
- (4) Arrange that the patient visit his own doctor.
- (5) Communicate himself personally with the doctor.

In old age the defensive forces of the body are at a low ebb. If too much calloused skin is removed from the foot of an elderly person and the underlying tissues left unprotected, the result may be a trophic ulcer. The obvious reason is that there is very little recuperative power left in the foot, and what would be a stimulus to fresh growth in a young person is an insuperable obstacle in an older patient.

Complications which may follow an incorrectly treated ulcer are —

- (1) Further infection may take place leading to *septicæmia*
- (2) *Contraction* of the scar may take place after healing leading to impairment of function
- (3) If the ulcer is situated over some part of the amputation such as the extensor hallucis longus, the tendon sheath and the tendon may adhere to each other and to the surrounding parts

Sometimes the patient is unaware of any systemic disease and the ulcer in the foot may be the first symptom that calls attention to the condition so that the chiropodist must exercise constant watchfulness

ABSCESS

When pus formation takes place remote from the surface it is walled off and an abscess is formed. This abscess will "point" in the direction in which it meets with the least resistance and it may track along the layers of tissues and come to the surface a long way from where it is formed. An abscess calls for surgical treatment.

Sometimes there are areas of focal sepsis in various parts of the body e.g. a decayed tooth neglected septic tonsils, appendicitis, duodenal ulcer or gall bladder trouble. It is believed that toxic products from these foci may invade the blood-stream and be carried all through the system. When there is continued irritation from a corn the surrounding tissues have a weakened power of resistance to such travelling toxins, with the result that there may be a septic development around the corn owing its origin to the original septic focus.

When the resistance of the body is low and the virulence of the invading micro organism is also low a low grade or chronic condition ensues. The body is unable to get rid of the infection and the infection is unable to spread in the tissues. Thus the abscess continues to drain on to the surface while a tough fibrous channel is formed round about it. This chronic sore draining on to the surface is known as a sinus.

CELLULITIS

CELLULITIS is an acute inflammation in the cells of the connective tissues. It is characterised by a spreading inflammation of the subcutaneous tissues, due to the presence and activity of pyogenic micro-organisms. There is generally a considerable amount of suppuration with sloughing of the skin

Etiology—The essential point in the history of cellulitis is the infection of the tissues by some active organism through a break in the skin. The tiniest prick or a mere abrasion of the skin is sufficient to afford an entrance. The chiropodist cannot be too strongly warned against any careless technique in the course of removing a corn. It is not possible for him to render the skin absolutely sterile without destroying it; and a single micro-organism hidden in a crevice of the epidermis may be driven by a moment's carelessness into the deeper tissues. Free hæmorrhage might probably wash the micro-organism out, but if there is no actual bleeding the invader may be apparently inactive for a few days

Symptoms and Signs.—These vary according to the particular organism present. Sometimes there is a multiplicity of organisms. There is always, however, an increasing amount of pain and diffuse swelling—the latter sometimes at a distance from the original site of inoculation. The patient has a sudden and alarming rise in temperature and generally feels "out of sorts." There is locally much reddening of the skin with œdema.

Treatment—This condition must always be treated by the patient's medical adviser. Until he appears on the scene the chiropodist should advise hot fomentations and complete rest for the inflamed part. It is essential that the chiropodist should be conversant with the symptomatology of inflammation, so that the immediate reference to a physician may ensure early diagnosis and prompt treatment.

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which multiply there and may thus be conveyed to any part of the body. If not checked it will have a fatal termination. Its treatment **must** be undertaken by a doctor.

SYNOVITIS

SYNOVITIS is inflammation of the synovial membrane. It is usually accompanied by a fluid effusion which may be serous or suppurative. It may affect any joint in the foot as a result of some local injury especially when associated with a septic focus. Because of this possibility the patient *must* always be under medical care should the inflammation not respond quickly to local treatment. It is characterised by swelling, sharp pain on movement, tenderness to touch and loss of movement.

Chiropodial treatment is essentially rest combined with antiphlogistic measures.

TENOSYNOVITIS

TENOSYNOVITIS is an inflammation of a tendon sheath. It follows overstrain of the tendon. The presence of toxic products from a septic focus is also a cause. There is also a suppurative form which may arise from an infected wound.

In the foot the usual location is in the tendo calcaneus (Achillodynia) and the chiropodist can feel a distinct crepitus or creaking on movement. The doctor should be consulted to eliminate systemic factors (gout, gonorrhœa or tuberculosis or seat of focus). Apart from these the cause will probably be an ill fitting shoe or excessive strain in dancing or stair-climbing etc.

Chiropodial treatment consists in radiant heat and limitation of movement by a thick pad under the heel and adhesive strapping from the plantar of heel to the mid-calf pulled tightly so that the foot is in a slightly equinus position.

BURSITIS

BURSITIS is inflammation of a bursa. It may be acute, subacute, or chronic. It may be traumatic or infective in origin.

A bursa is a small sac of fluid between hard and soft tissues which acts as a cushion and lessens friction during movements. Some authorities state that it contains serum, others maintain that it contains synovia. In the latter case there must be a direct connection with a joint. Some bursæ are *normally present*, and some are *adventitious*, due to abnormal pressure.

In the foot the condition of bursitis is most commonly met with (1) on the exposed head of the first metatarsal in a case of hallux valgus; (2) on the posterior area of the heel either superficially between the skin and the tendo Achillis or retrocalcaneally between the calcaneus and the insertion of the tendon, (3) over the cuboid in talipes equinovarus, (4) under a corn, especially over an interphalangeal articulation.

Treatment—The treatment in **acute** cases is *always rest* from the pressure which has caused it, and heat. Rest is not necessarily rest in bed. In bed there is often increased pressure from the weight of the bed-clothes in joint cases, and from the weight of the foot itself in heel cases. Care must be taken to eliminate these factors if good results are to be obtained in the shortest possible time. Sufficient rest is usually to be had by removal of the overlying corn or callus and the use of chiropodial padding and strapping (see Chapter Ten), or even by cutting the shoe.

Heat can be applied by a radiant-heat lamp combined withunction of iodine ointment, or hot fomentations, or dressing with 10 per cent Ichthyol in glycerine, or Scott's dressing, covered in with oiled silk or cellophane.

When the bursa occurs *under a corn* the removal of the latter will probably expose a *sinus*. As soon as the **acute** stage has subsided an attempt should be made to obliterate the sac. A drop of iodine fortis may be introduced, or the cavity may be treated with pure phenol neutralised immediately with spirit. Subsequent dressings may be balsam of Peru or B I P P.

In a **chronic** case the bursa may be excised by a surgeon, that is, after inflammation has subsided. Chronic bursitis may be treated with some rubefacient such as Scott's dressing or methyl salicylate, which should be applied at weekly intervals together with appropriate padding.

When the bursa is at the heel, then in applying a protective pad, care must be taken not to force the foot farther forward into an already short shoe. It is better to place the pad under the heel of the foot thus raising the bursa above the hard rim of the shoe (see p. 182).

Infective Bursitis frequently supervenes on a slight puncture of the skin in the region of a bursa, and if neglected may lead to cellulitis. Throughout treatment the very strictest antiseptic precautions must be maintained as a simple bursitis may lead to septicæmia.

If acute bursitis does not begin to subside after the first treatment, it should be referred to the doctor at once. It may be associated with tuberculosis, syphilis, gout, gonorrhœa or focal sepsis.

There is sometimes a subacute phase. When an acute case has subsided without the obliteration or removal of the sac the chronic stage will probably supervene. Should this be subjected to a fresh irritation it will be subacute, and thus is apt to be a recurrent condition.

CHAPTER FIVE

CONDITIONS AFFECTING MUSCLES AND TENDONS

THE following will be mentioned —

Cramp.

Strain.

Sprain.

Spasm.

Arthritis (included here because of the muscular changes associated with it)

Fibrositis.

Panniculitis.

CRAMP

CRAMP is a sudden painful spasm of a muscle. It is due to a local relative ischæmia and may follow excessive muscular activity where the blood supply is impoverished, *e.g.*, in arteriosclerosis. When it occurs in the ball of the foot or the toes it may be due to anæmia. During the night it may be a sign of poor circulation. It must be distinguished from various types of metatarsalgia.

Treatment consists in warm applications and rest.

STRAINS AND SPRAINS

STRAINS and SPRAINS should always be seen by the patient's doctor for full examination and possible X-ray, as a fracture is sometimes overlooked and mistaken for sprain.

STRAIN

STRAIN is produced by overwork either by one recognised trauma or by repeated and prolonged over-use. It is characterised by pain but no discoloration. It may occur in any

muscle or tendon of the foot and ankle, but it is commonest in the peroneus longus, the tibilis anterior and posterior, and the tendons of the great toe

Modified rest is indicated—that is not rest in bed, but the overwork should be eliminated and the part assisted by some form of bandaging or strapping which does not interfere with the normal functioning of the muscles (see pp 100 101)

SPRAIN

SPRAIN is a condition of sudden strain in which there has been tearing of some of the muscle fibres. It is characterised by acute pain and swelling and purple discoloration—this latter is due to the extravasation of blood. If there is any grating felt on movement it is a case of fracture of the bone. An X ray may often be necessary to exclude fracture. If the doctor decides that the chiropodist should give treatment, this is best carried out with adhesive strapping—‘stirrup and spur’ for ankle conditions, metatarsal strapping with ‘butterfly’ when the hallux is affected (see pp 100 101)

SPASM

SPASM is a tensing of a muscle in one position so that it cannot relax. It may occur anywhere. It may be of momentary duration as in the sudden cramp which follows an overstrained uncomfortable position of a healthy muscle or it may be of longer duration when a muscle has been overworked in the presence of some disease.

A case of spasm should *never* be undertaken by a chiropodist, as the prognosis is often good if the case is investigated at once by a doctor and suitable treatment given.

Etiology—There are two main causes for spasm. The first cause is associated with a diseased joint. The patient holds the joint in the easiest position and Nature assists this by producing a reflex spasm in the muscle.

The second cause is associated with some focal sepsis. In the Edinburgh Foot Clinic adolescent peroneal spasms are frequently observed. On surgical investigation the patient is usually found to have septic tonsils. When these are removed the spasm generally subsides.

Figs 84 and 85 show two different cases of foot-spasm. Fig. 84 is an example of peroneal spasm—sometimes called



FIG 84

Spastic flat foot in boy of 16 years who had rheumatic fever at 9 years. Note spasm of peroneals drawing foot into eversion.

spastic flat foot. It usually occurs in adolescence when a



FIG 85

Spasm of long extensors

boy or girl has recently left school and taken up some work which entails much standing and perhaps weight-carrying. The foot is continuously held in an everted position, and it is impossible to invert it even with much force. This is because the peroneal tendons are in a state of spasm and can be seen standing out like whipcords.

The boy whose foot is shown in Fig 84 was 15 years of age at 9 years he had rheumatic fever following tonsillitis. The foot was manipulated under an anæsthetic with excellent result.

Fig 84 shows a very obvious spasm of the long extensors; this was an interesting case mainly hysterical in origin. The patient was an adolescent girl who later suffered from St Vitus dance. Her father had a painful calcaneal spur and as his foot was better or worse so was hers.

ARTHRITIS

This is entirely outwith the scope of a chiropody manual but is briefly summarised here.

There are two varieties —

- 1 Osteo arthritis (traumatic non inflammatory)
- 2 Rheumatoid arthritis (inflammatory)

1 In OSTEO-ARTHRITIS the articular cartilage in the joint has been destroyed and an eventual overgrowth of bone takes



FIG 85

Shows a case of muscular wasting due to rheumatic causes. Feet are shown hanging down.

place, locking the joint. It is frequently seen in hallux rigidus. The early stages are characterised by pain, swelling and crepitus, and later by complete locking of the joint.

2. In RHEUMATOID ARTHRITIS the joint membrane is gradually destroyed, leading to atrophic changes in the



FIG 87

Another aspect of the right foot of
Fig. 86 at rest horizontally.

cartilage associated with local muscular wasting. As the disease proceeds there is an additional growth of fibrous tissue round the joint, and decalcification in the bones of the joint. The end result is a painful swollen joint with wasted muscle round it. In all varieties of rheumatism the symptoms are much exaggerated in persons with neurotic tendency.

Arthritic feet are often sent by the doctor to the chiropodist so that suitable padding and strapping may relieve the pressure on painful areas

FIBROSITIS

FIBROSITIS is a "rheumatic" manifestation in the muscles. It may be produced by the same systemic causes which produce rheumatoid arthritis and should always be under medical supervision. It is characterised by hard nodular swellings in the muscle fibres, with acute local or referred pain.

PANNICULITIS

PANNICULITIS is rheumatism of the connective tissue of muscle and skin. It is an inflammation of the fibres which attach the skin to the deeper layers. It is not often found in the feet and is not a chiropodial condition.

CHAPTER SIX

CONDITIONS AFFECTING BONES AND JOINTS

IN studying bones and joints their structure function, and lesions, the student must rely on his textbooks of anatomy and surgery. In this chiropody manual only those points are discussed which sometimes crop up in a chiropodist's practice. The following are referred to —

Flat foot,	Fractures	Dancer's
Pes cavus.	Sesamoid,	March
Broad or Splay Foot	Dislocation.	
Hallux flexus	Subluxation	
Hallux rigidus	Exostosis	
Hallux valgus	Periostitis	
Hallux varus	Osteomyelitis	
Hammer and Mallet Toe	Acromegaly	
and oblique contractions	Polydactylism	
Metatarsalgia.	Syndactylism	
Köhler's Disease		

FLAT FOOT

FLAT FOOT (*pes planus*) is one of the ambiguous terms sometimes applied to foot conditions. There is no one shape of foot which is normal to the human race, consequently it follows that the height of the arch varies in different individuals.

Flat foot is classified as —

- (a) Congenital, or
- (b) Acquired.

In actual experience a congenital flat foot may be a useful member fit for many years of hard service.

Acquired Flat Foot is a very different matter.

In Britain the treatment of acquired flat foot should be undertaken by the orthopædic surgeon, as it is often only

one symptom of a much larger disability. Chiropodists, however, are so often asked to assist in the treatment that some discussion of it is necessary here. Adolescents are frequently averse to consult a doctor, as they fear to lose some newly acquired "job" In their own interests they should be urged to have medical advice

The causes include .—

- 1 Increased weight-bearing.
2. Occupation.
- 3 Trauma.
4. Disease.

One or more of these causes may be present, so that it is essential that a doctor's advice should be sought.

Weight-bearing.—School children usually spend several hours a day sitting at lessons. If care is not taken to allow plenty of suitable exercise for muscle development, there is danger that under the stresses of puberty the foot muscles may give way as the body grows heavier. After middle age also there is a similar danger when the weight increases and bodily fitness decreases After any debilitating illness the feet are in a flabby condition, which predisposes to a flat foot

In *pregnancy* the mother should have special care with a view to avoiding flat foot

Occupation.—Mankind was not intended to stand rigidly upright for long periods Long walks are reasonable, also sitting or even squatting, but feet are not adapted for long periods of standing, hence teachers, nurses, salesmen, machinists, cooks, waiters, etc, who have to stand for many hours daily, frequently develop flat foot. Porters, errand boys, and others who have to carry excessive weights often find their feet giving way.

Trauma.—Almost any accident to the foot, if severe enough, may produce flat foot, because following upon any injury the victim may "carry" the foot in an everted abducted position which, if not checked, will lead to flat foot

Disease—*Rickets, anemia, tuberculosis, venereal disease,* and nerve disturbance such as *anterior poliomyelitis* are all liable to cause flat foot, hence the need to remain in touch with the patient's medical adviser.

Pathology—In considering the pathology of flat foot it is important to notice that the "flatness" is sometimes a secondary happening. The malalignment may consist in a broadening or splaying out of the foot in the transverse arch. Probably all the muscles and ligaments are in the same debilitated condition but the most serious condition would seem to be the stretching of the spring ligament. There is also a relaxation—sometimes subluxation—in the metatarsocuboid joint where a good deal of the body weight should fall in the standing position.

In the writer's experience success in strapping flat foot comes more quickly when sufficient attention is paid to bind the arch laterally so maintaining its shape. If strapping is correctly applied it will not interfere with muscular movement.

There are four stages in the development of acquired flat foot —

- 1 Incipient, where the shape is maintained but acute pain is experienced. This is known as Strained Foot.
- 2 Advancing, where the arch disappears under weight bearing but reappears when at rest. Pain is less acute at this stage which is known as Weak Foot.
- 3 Complete, where the arch has entirely gone even when the foot is at rest. The arch can be temporarily restored by manipulation as the foot is still mobile. There is very little pain in this stage.
- 4 Rigid.—When this stage is reached the articulations have become fixed and no movement is possible. Pain is almost entirely gone.

The history of a case is probably as follows. When the arch of a strong foot is overworked the muscles lose their tone slightly hence the responsibility for maintaining the shape of the foot falls upon the ligaments. This is when the pain begins. If the strain is continued the ligaments stretch and the shape of the arch disappears. After a short rest although the ligaments do not return to normal the muscles may recover their tone and restore the shape of the arch which, however, again disappears on weight bearing. When the overstrain is persisted in the muscles still further lose their tone and the foot remains completely flat. After this,

adhesions form around the articulations and the foot becomes rigid, the joint surfaces actually becoming altered in shape to accommodate to the new position.

Treatment.—**Incipient Stage.**—The cause should be sought for under medical direction and as far as possible removed. Rest is at first indicated. It may be necessary to resort to antiphlogistic measures such as radiant heat withunction of some iodine ointment.

Should the pain not be so very intense, suitable padding and strapping may be resorted to—in order to allow of the patient walking with comfort, as strapping gives support and maintains the shape of the arch, whilst allowing free use of the muscles. (For this, see Chapter Ten.)

Remedial exercises should not be attempted until the pain has completely gone. These exercises should be designed to strengthen the muscles which have become flabby, but they should be supervised by a trained medical gymnast, as even tiptoe rising will do harm if it is not carried out properly. If the patient is left to himself he will probably over-exercise for the first few days and then neglect his routine practice.

Swimming is one of the most suitable exercises, as it can bring into play nearly every muscle in the body, whilst the weight is supported by the water. A word of caution is needed, as unwise swimming in our thoroughly British climate may be disastrous to anyone in a subnormal condition.

It is interesting to notice that when a young person first complains of incipient flat foot the whole body, when sitting, slouches forward until the spine is in a position somewhat similar to that of the newborn infant. Bearing this in mind the chiropodist will realise how impossible it is to restore the arch of the foot by local treatments, and why the doctor should be consulted early.

Another important point is, before a child can be re-trained to walk and stand properly he must be able to sit properly. It is remarkable how few households possess chairs on which a young adolescent can sit in comfort. Nursery chairs are provided for young children, but those of 10 to 15 years old should have due consideration also if they are to maintain a correct posture at all times.

Advancing Stage.—At this stage the arch of the foot disappears under weight bearing. An enfeebled musculature has thrown too much weight on the ligaments. These latter have given up fighting as it were and have stretched—thus letting the arch *broaden laterally*—and the head of the talus sinks. The consequent pain is disappearing as there is now less straining on Nature's part to maintain the arch.

The doctor may prescribe massage remedial exercises, etc. but these have their principal effect on the muscles. The ligaments also must be considered if a full cure is to be effected. A suitable pad of felt (see Chapter Ten) should be fitted into the arch and bound with strapping round the tarso-metatarsal region. This if properly done, will not interfere with muscle movements and if applied persistently will maintain the ligaments in a contracted position until the muscles recover their tone.

Sometimes adhesive strapping is contraindicated (see pp. 150, 151, 154). In this case the pad may be attached to an elastic band worn next the skin or it may be fastened to a leather strap worn above the stocking. The pad may be adhered to the sole of the shoe but in this case the latter must fit very snugly in the shank and waist otherwise the binding effect is lost. Also the pad should be put in position by the chiropodist—the responsibility of its correct placing should not be left to the shoe salesman.

Complete Stage.—The muscles are generally too flabby to allow of active exercises. They do not respond correctly to the patient's attempts to stand on tiptoe—hence the doctor will probably prescribe massage and passive exercise. But even from the very first day of treatment it will be found helpful to include chiropodial strapping as this assists the patient in everyday walking and standing. A Thomas heel is often applied to the shoe—but in the writer's experience its weight is objectionable especially in the case of children. Added to this, the rigidity of the leather extension militates against the full use of the plantar muscles.

After a few weeks of strapping and passive movements it will be found that the patient can begin active movements those that can be performed in a sitting posture are to be practised first e.g. ankle rotating and toe-creeping.

history of two broken bones, but the consulting surgeon was of opinion that this had no connection with the cavus condition. The foot was *soft* and *relaxed*, and the condition had been

much aggravated by very short shoes. Note the high outer longitudinal arch and contracted toes. As will be seen, these abnormalities disappear under weight-bearing, as shown in Fig 91.

As long as the foot is mobile and the patient young the chiropodist can achieve an excellent result in such over-arched feet with attention to footwear (shoes and socks), in addition to strapping, if there is



FIG 92

Figs 92 and 93 show another high arch without systemic complication. It was treated with metatarsal bar on shoes and metatarsal pad on foot.



FIG 93

no underlying systemic condition. It will be noticed that the foot is generally splayed out considerably in addition to the dorsiflexion of the toes. A metatarsal pad placed well forward and firm strapping round the whole metatarsal

area is generally found of greatest service. If the case is very pronounced a tension strap should be used first, as shown on p. 157, to re-align the toes. If the foot is intolerant of firm adhesive strapping a metatarsal bar should be fixed to the shoes and remedial exercises practised under a doctor's advice.

In later adolescence the type of over arching shown may become very painful owing to the formation of adhesions also the extensor tendons of the toes may be seriously contracted as well as the plantar fascia. Obviously surgical advice is called for as soon as the condition is observed.

In later life when the condition has become chronic deep seated corns will probably occur under any or all of the metatarsal heads. At this stage palliative treatment with wing or bar pad gives comfort. It is important that the padding should also be extended posteriorly to the cuboid area in order to bring the outer border of the foot into weight bearing.

BROAD FOOT OR SPLAY FOOT

BROAD FOOT is an acquired shape due to the splaying out of the metatarsals into an exaggerated fan shape. This happens in adolescence when the foot is still growing and outgrown footwear is worn. There is a hypotonic muscular condition in the presence of increased weight. Sometimes it is produced in early childhood before the tenth year and is induced by wearing short footwear. In infancy it may be due to a small tight sock which causes the hallux and the fifth toe to approach each other distally. This causes an oblique backward pressure on the first and fifth metatarsal heads which in turn are pushed outward from the midline of the foot.

Metatarsus primus varus is sometimes a congenital condition and leads necessarily to splay foot. In this condition the first metatarsal deviates more than normally towards the midline of the body i.e. away from the midline of the foot.

Figs. 94 and 95 show an unusual type of splay foot where the fifth digit is the most affected. The X ray plate

shows the cause—a supernumerary bone between the fourth and fifth metatarsals. The patient was 6 years of age, and



FIG 94

Shows an unusual splaying of the fifth toe caused by the supernumerary bone shown in the X-ray (Fig 95)



FIG 95

ossification was incomplete. Clearly this is a case for the surgeon

HALLUX RIGIDUS

HALLUX RIGIDUS is the name of a condition in which the first metatarso-phalangeal joint has stiffened. It is often associated with pes planus, and sometimes with hallux flexus or valgus (see Fig. 150, p 167)

It is a very disabling condition in the initial and progressive stages, but when complete immobility is attained the pain may cease. At long intervals an inflammation of the joint is liable to recur, causing severe pain.

Etiology—Hallux rigidus usually results from persistent trauma, such as from short footwear. This eventually wears away the cartilage, and osteo-arthritic changes follow with exostosis formation, particularly on the dorsal aspect of the joint. This results in progressive limitation of movement.

Treatment—In the early stages after direct trauma, such as a stubbing of the first toe the best treatment is to give the joint complete rest by means of immobilisation until the inflammation and pain subside in addition to this the frequent application of radiant heat is beneficial

Different methods have been tried to procure this temporary immobilisation The simplest is a metatarsal bar It consists of a bar of leather $\frac{3}{4}$ in broad and $\frac{1}{4}$ to $\frac{3}{8}$ in thick placed on the under side of the sole of the shoe just behind the metatarsal heads In the course of walking this bar causes the foot to rock forward from the heel directly on to the toes (see p 180) It is moderately successful in relieving pain

Another method is to insert a metal strip between the layers of the sole of the shoe, reaching from heel to toe

To chiropodists the "immobilising strapping" (p 166) can be confidently recommended

Hallux rigidus is sometimes aggravated by a plantar flexed position of the hallux at the metatarsophalangeal joint

The term hallux flexus is sometimes used for this rigidus condition as well as for the condition described below

Medical diagnosis should always be sought in hallux rigidus as it may be a symptom of some systemic disease which is tractable in the early stages

HALLUX FLEXUS

HALLUX FLEXUS is the name also given to the condition which arises when the hallux is flexed dorsally at the metatarsophalangeal joint and plantar flexed at the interphalangeal joint. Occasionally a case is found when only the distal phalanx is affected and it is flexed dorsally

Etiology—There are two distinct possible causes for this—

- (a) A condition of drop foot due to *paralysis* of the anterior tibial muscle
- (b) A *local condition* due to faulty footwear

(a) When the *tibialis anterior* is paralysed and consequently unable to lift the forefoot its function is partly taken over by the extensor longus hallucis This muscle acts by raising the hallux whilst it is opposed by the flexor which pulls the distal phalanx downwards, thus causing the hallux flexus position

(b) When footwear—either sock or shoe—is too short, the hallux is forced to occupy either the flexus or the valgus position. Short tight shoes predispose to the former and short wide shoes to the latter.



FIG 96

Shows the foot of a boy aged 13 years with hallux flexus the hard corn at the interphalangeal joint had a serous discharge when first seen

Treatment—(a) It is essential that the paralytic patient should be under medical care so that transplantation of tendons may be carried out if the case is suitable. The chiropodist's part is to treat the corn, which will probably be found on the dorsum or on the apex of the hallux, and then pad the toe to ensure greater comfort.

(b) When short footwear is the cause that must be put right first. If the joint capsule is flexible correct footwear and corrective padding may remedy the condition entirely.

With a dorsiflexed proximal phalanx and plantar flexed distal phalanx the pad should be blunt, wedge-shaped and placed under the interphalangeal joint. Compressed or semi-compressed felt is best for this as the pad must be sufficiently firm to resist the toe's effort at flexion: it can be lengthened as the condition improves. If there is a corn on the dorsum it should be enucleated and protected proximally with a crescent pad.

In the case of dorsiflexion of the distal phalanx the first inclination is to place a pad on the tip of the toe, but this is apt to injure the matrix of the nail if continued long enough to affect the joint. The desired result can generally be obtained by placing a long pad of felt under the first phalanx. The patient should be instructed to exercise the joint passively and actively—provided there is no



FIG 97

Shows a hallux flexus due to short footwear

systemic disease affecting it. This should be ascertained from the family doctor.

Fig 98 shows the foot of a boy aged 13. The chiropodist was asked by the surgeon to pad the toe until the school holidays would give opportunity for surgical treatment. With padding as described on p 102 the foot improved so much that no further treatment was necessary.

If adhesive felt cannot be tolerated then animal wool can be employed in the manner described on p 149.

Traumatic cases are most commonly met with in adolescence. Children leaving school at 14 or 15 years and taking up some occupation involving severe foot strain are liable to show a tendency to hallux rigidus. In the writer's experience this is partly due to short footwear. If the shoe is short and wide, the hallux will tend to the valgus position, i.e. towards the midline of the foot. If the shoe is short and close fitting there will be extreme pressure at the interphalangeal and metatarso-phalangeal joints which will probably lead to hallux rigidus or hallux flexus and rigidus.

Other cases have been traced to a slight injury to the joint in the pursuit of various forms of athletics followed by the patient keeping the joint stiff for fear of pain in using it.

HALLUX VALGUS

HALLUX VALGUS is the name given to that deformity in which the great toe deviates outwards with a corresponding lengthening of the medial ligaments and a shortening of the lateral ligaments at the metatarso-phalangeal joint, and a lateral displacement of the extensor and flexor muscles which have their attachments in the toe.

The student is referred to his anatomy textbooks for the construction of a ball and socket joint. He should note especially that the convex head of the first metatarsal fits into the concavity of the proximal phalanx. The capsule enveloping the joint consists of fibrous tissue which is not uniformly thick. It is lined on the inner aspect with synovial membrane.

which also covers those portions of bone which have no articular cartilage. Synovial membrane is sensitive whilst articular cartilage is not. The extensor longus hallucis passes over the joint and the flexor longus hallucis under it, but neither is in any way attached to it.

The abductor, adductor, and flexor brevis hallucis arise in the foot and are inserted into the base of the proximal phalanx on its plantar aspect. Sesamoid bones are developed in the tendons of the last named before their insertion.

Etiology—The causes of hallux valgus vary and may be classified as follows :—

1. PREDISPOSING CAUSES .

- (a) *Metatarsus primus varus.*
- (b) *Splay foot.*
- (c) *Weak foot*
- (d) *Flat foot*

2. EXCITING CAUSES

- (a) *Faulty footwear.*
- (b) *Weight of bed-clothes in protracted illness.*
- (c) *Trauma.*
- (d) *Occupation.*
- (e) *Overuse or misuse of muscles, e.g., toe-dancing in young children or walking with toes pointing out (see p. 3).*

To sum up briefly, the cause of hallux valgus is misuse of the joint. Short-pointed shoes or socks cause the toe to deviate from its true alignment, but any repeated stubbing of the great toe, or even the weight of the bed-clothes in a protracted illness, will have the same effect on the first metatarso-phalangeal joint.

In childhood a shoe is often worn after it is outgrown, or sometimes the original fitting is too loose. Both of these misfits allow the great toe to press against the toe-cap. This causes an irritation in the metatarso-phalangeal joint which is often the precursor of hallux valgus.

It must be noticed that when once the hallux begins to deviate, the greater the pull of the long extensor than the

greater is the deviation. This must be borne in mind when exercising the joint and the chief exercise should be stretching the contracted tendons and not merely the circumduction of the toe as normally practised.

Occurrence —Pronounced cases have occurred in girls of 11 years (see Fig. 9) but its onset is more usually observed in early adult life though it may not give serious trouble till middle life.

Hallux valgus in itself may not give rise to pain or any disabling symptoms. Patients are frequently encountered where although the condition is of long standing, it has never been a source of trouble. If, however repeated trauma from a shoe on the exposed head of the first metatarsal causes an exostosis to form and if the overlying soft tissues or adventitious bursa become inflamed then we have the crippling condition known as bunion.

The fully developed case presents the following features —

- 1 The ligaments are stretched on the medial side of the joint
- 2 The ligaments on the lateral side contract
- 3 The hallux is (by shortening extensor and flexor hallucis tendons) pulled away from its true line and deviates towards the outer toes
- 4 There may be hypertrophy of the metatarsal head and an exostosis formed accompanied by slight rotation of the bone round its long axis. The metatarsal is in a markedly varus position
- 5 An adventitious bursa forms over the exostosis
- 6 Hammer toe of the second digit may develop

Treatment —In the later stages, when the metatarsal head is affected and the foregoing complications have supervened only surgical treatment will give lasting results. Not every sufferer from hallux valgus can afford the time required to make a success of this operation in connection with which after-care is of such importance. In such cases the conservative treatment as outlined for the initial stage will afford a considerable degree of relief.

In the initial stage in childhood the condition may be cured by conservative treatment if the toe is held by

mechanical means in the proper alignment for a prolonged period, and always provided that the footwear is correct.

The simplest treatment of all is a sock with a separate compartment for the big toe and some sort of "tractor" to wear on the foot at night to counteract the weight of the blankets. The drawback to this is the difficulty of fitting a digitated sock with sufficient accuracy. If it is easily fitting, it is no use; if it is tight, it is harmful. Besides this there are few people having sufficient will-power to wear stockings that will only fit on one foot!

Another device is the toe-post boot, *i.e.*, a boot in which there is a stout division separating the first and second toes. This, again, requires the same feature in the sock. The making of such a shoe is fraught with almost unsurmountable difficulty to the shoemaker if he is expected to turn out an article which is comfortable and shapely as well as corrective.

The "butterfly" strapping (see p. 158) is very popular with those chiropodists who have used it for any length of time. In the writer's opinion, when this is combined with correct metatarsal binding there is a good result, as it has the effect (in a mobile case) of reducing the splaying out of the metatarsals. The strapping should extend to the base of the metatarsals.

Should a corn form over the bony prominence of the bunion this should be removed first in the usual way (see p. 27).

Occasionally a ganglion may occur on the extensor longus hallucis tendon, which must not be confused with a bursa. The ganglion should be dealt with by a surgeon, and the patient should be urged to seek his help, but in case of refusal an extra thick pad will help to protect it.

There may, however, be a *bursitis* complication revealed when the corn is removed and there is exposed a sinus leading into the bursa. While inflammation is present, radical operative treatment cannot be carried out and the chiropodist can in the interim give great relief by antiphlogistic measures and protective padding and strapping (pp. 156, 190).

Treatment for bursitis is indicated on p. 81.

Rest is a most important feature of the treatment of all types of inflammation of the foot. This rest need not be in bed, indeed, that is sometimes contraindicated as the

weight of the bed clothes must always be considered. The required rest for the joint can most easily be obtained by cutting the shoe and fitting in a balloon patch of very soft kid. The cutting of the shoe must be on the grand scale as too small a patch will aggravate matters. When this has been arranged for it is possible to alleviate the pain by



FIG. 98

FIG. 99

Figs. 98 and 99 show two aspects of hallux valgus with sinus complication

antiphlogistic measures but only surgical interference will ensure permanent comfort.

Radiant heat may be applied daily or every other day with some iodine ointment. If the patient cannot return so frequently a pack of iodine or Ichthvol and glycerine can be used. A pad of thick felt is fitted over and round the joint, having a wide opening over the inflamed part. This is filled in with Ichthyol or iodine in ointment form and the whole is covered in with gauze and oiled silk. This is left undisturbed for a week when the treatment can be repeated if necessary.

When the inflammation has subsided the joint should be protected by a crescent pad on the proximal aspect. If the joint is mobile a full butterfly dressing may be used (see Chapter Eleven on Footwear and Chapter Ten on Padding and Strapping).

HALLUX VARUS

HALLUX VARUS is the name of the condition in which the great toe deviates away from the other toes and points towards the middle line of the body. It is an exceedingly rare condition, as footwear has usually the effect of counteracting any such tendency. Cases are known, however, where there has been a supernumerary phalanx attached to the first metatarsal between the first and second toes. Diagnosis must be confirmed by X-ray and the treatment is surgical.

HAMMER TOE ; MALLET TOE

In HAMMER TOE the toe is flexed dorsally at the metatarsophalangeal joint and plantar-flexed at the medial and distal joints. In MALLET TOE the toe is dorsiflexed at the medial joint and plantar-flexed at the distal joint.

Etiology.—It is a much-debated point whether these conditions are more frequently congenital or acquired. The predisposing factor is undue length in one of the three middle toes, although more frequently it is the second toe which is longer than the great toe. Yet even so, hammer toe may not occur without some exciting cause, which may be either backward pressure from too short footwear, or lateral pressure from the great toe. A short sock in babyhood is very often to blame, and if an abnormally long toe is restricted in free development during early childhood and allowed to acquire a plantar flexion, there is every probability that when the child begins to wear boots or shoes these latter will be fitted too short.

There is often an associated condition of hard corn either on the apex of the toe or on the dorsum of the first or second interphalangeal articulation, and it is common for a *bursitis* to develop over these joints. It is the pain from any one of these causes that brings the patient to the chiropodist.

As long as the toe is mobile there is every chance of prevention of pain by means of suitable padding and strapping (see p. 168).

If the toe is *rigid* and *painful* it will be well to ask the patient to have a surgeon's advice. In a suitable case he may excise the proximal joint, thus shortening the toe considerably.

The *corns* should be enucleated as described on page 27. The *bursitis*, if present, is usually treated with radiant heat and iodine ointment or a Kaolin poultice. This latter can now be had in a plaster form which is very easily applied. The part should have complete rest and the shoe should be



FIG. 100



FIG. 101

Figs. 100 and 101 show two aspects of a hammer toe. Note also the approximation of the distal phalanx of the great toe towards the third toe.

well cut back and have a balloon patch of soft kid over the affected part. When the inflammation shows signs of yielding subsequent treatment may consist of cold wet applications of Burow's solution or extract of hamamelis or *ruta graveolens* lotion.

OBLIQUE CONTRACTION OF TOES

OBLIQUE CONTRACTION of the toes is a condition in which one toe underlies or overlaps the neighbouring toe. It may be associated with hammer toe of the neighbouring digit.

Etiology —There are two possible causes —

1. In childhood the foot may have been confined in a sock or shoe which had been outgrown. This would crowd the toes together and one or more would grow in an unnatural oblique position. Owing to the softness of the connective

tissues the child would suffer no pain. The second, third, fourth, or fifth toes may all be affected in this way (see Figs 1, 2, 5, and 6).

2 In adolescent or even adult life the same result may follow the use of cramping footwear (see Fig 58), but curiously enough a similar result may eventuate from too wide shoes. In the latter case it is the fourth or fifth toes which suffer. Sometimes there is a well-defined callous ridge with highly vascular centre along the edge of one of these toes. The patient is generally accused of wearing too tight shoes when actually the opposite may be the case. When the shoes are too wide there is a tendency to slide forward inside them at every step. In an attempt to counteract this the foot makes an automatic gripping movement, which is specially noticed in the fourth and fifth toes.

Treatment—In both these cases the treatment is alike. First, see to it that all the footwear is properly fitted, then use appropriate padding to correct the alignment of the toes. It is generally wisest to correct the obliquity first. That is, if the fourth toe underlies the third a bulky pad should be placed under the third to force the fourth into the extended position.

There may be a corn in the nail sulcus of the fourth toe. This should be carefully enucleated and dressed, and it will quickly tend to disappear if the third toe is kept padded and the footwear is correct.

After two or three months it will be noticed that the callous ridge has almost gone, then, if the toe is not yet properly aligned, a prop may be worn under the fourth.

If several toes are affected it may be claw toe. This is a paralytic symptom which requires medical care.

PAIN IN THE METATARSO-PHALANGEAL AREA

It has long been a debated point whether there is or is not an anterior metatarsal arch. The question is one for the consideration of and decision by anatomists. It is nevertheless a fact that pain in this region (whether due to congenital or acquired deformity, or to malalignment) is the factor which brings a large proportion of cases to the chiropodist for advice.

Owing to the civilised fashion of wearing shoes with heels (either low or high) there is an unwarranted proportion of body weight carried on the metatarsal heads (see p 177). The smaller toes should lie almost in a continuation of the line of the metatarsals. Because of the height of the heels this line is broken and the toes are dorsiflexed at a greater or lesser angle to the metatarsals in proportion to the height of the heels. It follows that the tip of the metatarsal head which should be protected by the concavity of the proximal phalanx is deprived of that protection and is compelled to carry weight on the tip. The plantar ligaments at the articulations are in a state of permanent strain. This is the incipient state of metatarsalgia and is usually very painful.

One point which calls for serious attention from the chiropodist is the condition which arises in the footwear. In cheap shoes the filling becomes softened owing to the heat of the foot. Gradually a slight concavity appears in the inner sole. The first and fifth metatarsal heads are held in position near the firm welting but the second, third and fourth heads sink down into the concavity of the sole. This constitutes a genuine dropping of the metatarsal heads which the chiropodist must be prepared to treat.

A further cause of aggravation is to be found in the style of shoe worn by men as well as by women. In the writer's opinion a large number of shoes worn to-day have been constructed from lasts whose proportions are unsuitable. Upon examination many people will be found wearing shoes with an arch almost half an inch shorter than the arch of the foot. To this fact is partly due the success of the metatarsal

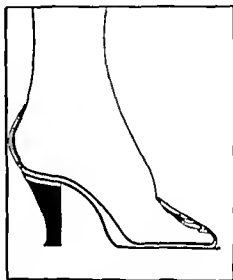


FIG 102

This shows a badly fitted shoe which often causes metatarsalgia. The arch of the foot is longer than the arch of the shoe.

bar, which, being placed immediately posterior to the metatarsal heads, forces part of the shoe sole up to form a continuance of the arch of the shoe.

On reference to Fig 102 it will be noticed that there is an empty space in the shoe just behind the metatarsal heads. This indicates that the widest part of the shoe is not being used by the widest part of the foot, *i.e.*, the widest part of the foot is pressed forward into the narrowing part of the shoe. Hence the shoe chosen is generally too wide for the foot and the toes have to maintain a constant gripping movement to hold the shoe steady. To this we may ascribe the popularity of the commercialised arch support. It fills up the empty space, it lengthens the arch of the shoe, and generally makes badly fitted footwear moderately comfortable.

In a chiropody experience extending over forty years the present writer has found that men as well as women suffer frequently from this type of faulty footwear and that anterior metatarsal arch troubles nearly always improve when treated with shoes which are long enough in the arch and tight enough in the waist.

CAUSES OF PAIN

There are several different causes for pain in the metatarsal area, often referred to as metatarsalgia. The following will be considered —

- (a) Arthritis in the metatarso-phalangeal joints
- (b) Anterior foot strain
- (c) Cysts formed after slight rupturing of the soft tissues under callosities
- (d) Bursitis under the heads of the metatarsals.
- (e) Secondary septic processes following on some focal sepsis.
- (f) Neuritis
- (g) Neoplasms such as neuroma or fibroma.
- (h) Köhler's disease (osteochondritis).
- (i) March fracture
- (j) Displaced or fractured sesamoid

(a) Arthritis.—This may be either rheumatoid or osteoarthritis. The latter may be distinguished by crepitus, and

In all there is limitation of movement there is sometimes an associated *synovitis*. The characteristic manifestations of rheumatism may be found in other parts of the body.

(b) **Anterior foot strain** involves mainly the transverse ligaments, the flexor tendons, and the interosseous muscles. It always has a history of gradual onset. In its later development it may be complicated by either cysts or bursitis. This is what Mr. Runting describes as "bursitic type of metatarsalgia." It is often associated with sprawling out of the foot after periods of prolonged excessive exercise.

(c) **Cysts** may be found under the metatarsal heads when there is much calloused skin. Too roomy shoes allow the feet to slip about, and this produces considerable hypertrophy of the epidermis. It is probably this development which causes slight rupturing of the soft intervening tissues thus encouraging the formation of cysts.

(d) **Bursæ** may be found when the body weight is carried more on the distal end than on the plantar surface of the metatarsal heads. This occurs sometimes in claw foot or arthritis.

When metatarsalgia is due to a cyst or a bursa there is a feeling of fullness in the foot and the pain is dull, sometimes throbbing. The skin appears dusky red.

(e) When there is a **septic focus** present (see also p. 81) the metatarsal area is bright red, there is much swelling and severe acute pain. This type is usually associated with septic



FIG. 103

Shows a case of "bursitic metatarsalgia." Note the large bulbous swelling on the plantar metatarsal area which the tips of the toes are almost touching.

tonsils It must be under the care of the doctor. It is surprising how few hours need elapse before the condition subsides after the removal of the primary sepsis.

(f) In **neuritis** there is not much swelling, but sometimes intense redness and also a relaxed condition of the



Figs 104 and 105

Showing osteoarthritis, which is secondary to neglected old-standing Kohler's disease of second metatarsal

metatarsal area which allows of spreading. It is characterised by sharp pains which seem to shoot into the toes when they are moved. The patient also complains of cramp in the foot and calf of the leg during the night. These pains are always worse after a day of greater exercise than usual. When this pain is associated with the fourth metatarsal head it is recognised by American authorities under the name "Morton's toe" or "Morton's metatarsalgia," the reference being to Morton of Philadelphia, who described it in 1876. Previous to this it had been described by Jones of Liverpool.

The pain is said to be due to one of the

plantar nerves being pinched between a subluxated metatarsal head and the next metatarsal or the ground. Some authorities have doubted this cause owing to the unlikelihood of so small a nerve being "pinched." The real explanation may be that, owing to the inflammation of all the soft tissues in the area, the nerves are in a state of

congestive irritation which not only gives rise to pain but also to the sudden cramp like spasms in the muscles

Not so long ago it was common to have an excision of the toe and metatarsal head involved. This probably cured the metatarsalgia, but all the cases so treated known to the writer have had an unfortunate issue in the consequent malposition of the remaining toes

(g) In a case of *neuroma* or *fibroma* the small tumour can be distinctly felt on palpation but there is *no surface manifestation* as there is in a case of *verruca*

(h) *Osteochondritis* is a disease embodying both cartilage and bone. When found at (1) the head of a metatarsal or (2) the navicular it is described as *Köhler's disease*. The condition is generally unilateral and in the navicular only



FIG. 100

Radiogram of Köhler's disease of the third and march fracture of the second metatarsal. By courtesy of Mr John Bruce and the proprietors of the *Edinburgh Medical Journal*.

occurs in children and early adolescents before complete ossification of the cartilage. Ossification is retarded and the nucleus of the bone shrinks

When it occurs in a metatarsal it is characterised by pain in the forefoot, which is definitely associated with one metatarsal, usually the second (see Fig. 104). Sometimes the dorsum appears swollen. The head of the bone is thickened and malformed and movement is restricted.

When it occurs in the navicular there is pain on walking which is thought by the parents to be attributable to flat foot. In consequence the child may be made to do tip-toe exercises which aggravates the condition.

Osteochondritis is clearly a case for medical supervision. Immobilisation and rest are essential in order to avoid the strain of weight-bearing.

As a "first-aid" dressing the chiropodist should apply a metatarsal pad and a firm strapping.

(2) **March fracture** is a condition which is sometimes associated with ordinary metatarsalgia. It is a fracture of



FIG 107

Shows a march fracture of the second metatarsal consequent on a hallux valgus operation which shortened the first metatarsal and threw more weight on the second.

the neck of one of the metatarsals, most frequently the second (see Figs 106, 107, and 108), and may exist for some little time

without any displacement. A sudden mis step or stubbing of the toes accompanied by a sudden onset of pain will reveal it. The condition is said to be the result of an atrophy of the metatarsal near the head due to interference with the blood supply as the result of repeated spasms of the interossei. The name arises from the fact that its onset is frequent in soldiers following upon a long march or in hikers unaccustomed to the wearing of heavy boots.

It is a case which calls for X ray examination and medical supervision. The chiropodist should suspect it when he feels a thickening in the shaft of the bone (It must not be confused with Köhler's disease (p 115) in which it is the head that thickens). This thickening—due to the repair of the fracture—is not apparent until about three weeks after healing has commenced so that an early X ray will show no diagnostic signs at all unless there has been displacement.

As a first aid dressing until the doctor can examine it, the chiropodist should place a firm protective pad under the metatarsals and strap the forefoot.

(j) The *sesamoid*, which is found at the insertion of the flexor hallucis brevis may be displaced or fractured as the result of trauma, such as an awkward landing on the foot after a jump or drop. The doctor should be consulted as to the advisability of surgical interference. If he decides against



FIG 108

Radiogram of a typical march fracture. Note the short and abducted first metatarsal. By courtesy of Mr John Bruce and the proprietors of the *Edinburgh Medical Journal*.

it, then the usual metatarsal pad should have L-shaped extension round the first metatarsal head

Metatarsalgia will usually yield to chiropodial treatment. If it is of recent occurrence, complete relief from pain may take place as the result of one treatment, although this must be continued to effect a cure. On the other hand, patience may be necessary in a case of long standing before the pain disappears.

Treatment—The callous skin, if any, should first be removed, then antiphlogistic measures must be employed to soothe the parts. Best of all is rest—but as this is frequently out of the question owing to the patient's occupation, some dressing must be sought which will suit the case. Radiant heat withunction of iodine, or a Kaolin poultice or wet compress of hamamelis, or of aluminium acetate, are all efficacious. The selected remedy should be applied daily until the severe pain subsides. In addition, as soon as the condition of the foot will allow (possibly at the first visit) some mechanical means should be adopted to relieve the heads of the metatarsals from as much weight as possible.

If the arch of the shoe is too short, then a bar of leather about $\frac{3}{4}$ in broad and $\frac{3}{8}$ in thick may be attached underneath the shoe just posterior to the metatarsal heads (see Chapter Eleven on Footwear). This should be worn until the inflammation has subsided and new shoes can be correctly fitted.

In addition, as soon after the commencement of the treatment as possible a metatarsal pad of felt, $\frac{3}{8}$ to $\frac{1}{2}$ in in thickness, should be applied. This may be attached by adhesive strapping round the foot or by loops over two or more toes. The pad should extend laterally across the foot between the first and fifth heads, but under the second, third, and fourth only, and longitudinally from the digital side of the metatarsophalangeal articulation to about three-quarter way towards the bases of the bones. This position is different from what has hitherto been considered orthodox. Students in the past have been instructed to place the pad "back of" the metatarsal heads. But experience has shown that the pad should be placed where Nature has demanded it and sometimes grown it—*i.e.*, just over the heads (see Chapter Ten on Padding and Strapping).

If the toes are much dorsiflexed then a tension strap may be used before applying the pad. This is a strip of adhesive plaster 4 to 5 in. long and 2 to 3 in. broad according to the size of the foot. The strap is applied to the plantar surface close up under the toes and pulled firmly back so as to bring the proximal phalanges more nearly in line with the metatarsals. Tinct. benz. co. should be painted on first to avoid skin irritation where the wrinkling takes place. Treatment should be persevered with until the pain has completely gone.

It may not be possible to effect a complete cure i.e. to restore the foot to its normal shape but if suitable footwear is worn with a metatarsal pad or bar if necessary there should be no recurrence of the pain.

FRACTURES

FRACTURES must of necessity be under medical supervision. There are, however, some cases which may be met with in a chiropody practice as the patient does not realise the cause of the pain.

A phalanx may be broken as the result of a heavy weight falling on it. The first and fifth toes are the most commonly affected. The terminal phalanx of the great toe is sometimes splintered by a horse's hoof and this may be wrongly diagnosed as ingrown nail.

The base of the fifth metatarsal may be fractured as the result of a sudden mis-step when the patient comes down forcibly on the lateral border. It was so described by Sir Robert Jones and is known as *dancing fracture*.

A sesamoid under the hallux may be fractured as the result of dropping from a height and landing on a hard surface.

These may be recognised by the gritting of the fractured ends on movement, but radiography gives the only certain diagnosis. A first aid dressing consists of an adhesive strap drawn firmly round the parts affected to prevent further movement. The patient should be referred to his doctor without delay.

March fracture is described under Metatarsalgia (p. 116).

DISLOCATION AND SUBLUXATION

DISLOCATION of a joint is the condition which ensues when the articulating surfaces of the bones constituting the joint are completely displaced from each other. SUBLUXATION exists when the articulating surfaces are only partially displaced (see Fig. 18).

Occurrence.—In the foot dislocation is most commonly met with in the metatarso-phalangeal joints. The base of a phalanx may be between two of the metatarsal heads or may even be found to lie over the dorsal aspect of the head of the metatarsal.

Subluxation is commonest in the interphalangeal joints—sometimes as oblique subluxation. The bones of the tarsus may also be subluxated as the result of a sudden jarring step or of weak foot.

Treatment—Medical opinion should *always* be consulted before any attempt at replacement is attempted.

EXOSTOSIS

EXOSTOSIS (osteoma) is a small abnormal outgrowth of bone. It usually follows some injury to the bone which



FIG. 109

Exostosis at the base of first metatarsal

causes the periosteum to become ruptured over a small area. It is of slow growth and seldom gives rise to pain unless it

causes pressure upon a nerve or upon a bursa which has developed over it.

An exostosis may occur anywhere but on the foot the usual sites are on a distal phalanx on the head of the first metatarsal (either on the dorsal or medial aspect) at the base of the first metatarsal on the dorsum or on the calcaneum either on the posterior aspect or more commonly on the plantar aspect.

On the terminal phalanx it is most frequently a subungual exostosis and as such it is described on p 56 At the base of the first metatarsal on the dorsum it is probably caused by irritation from the eyelet of a shoe or from too tight fastening



FIG 110

X ray of exostosis on the talus



FIG 111

Exostosis at the head of first metatarsal.



FIG 112

Another aspect of Fig 111



FIG 113
X-ray of calcaneal spur

In whatever position it occurs, when the patient first draws attention to the part there will probably be inflammation of the soft tissues and possibly a bursa overlying the exostosis. If for any reason surgical measures are not advised, a suitable anti-phlogistic and the application of protective padding will relieve the condition.

An exostosis on the plantar aspect of the calcaneum (Fig 113) is known as a "spur". Whether the presence of the spur is one of the



FIG. 114
X-ray of retro calcaneal spur

factors responsible for pain in the condition commonly known as painful heel is a debated point. The pain may arise from a toxic inflammation due to a focal sepsis,



FIG. 113

Exostosis under head of first metatarsal. The calcified blood vessel seems pointing to it.

or it may be caused by a periostitis at the attachment of the plantar fascia, which in turn may be a symptom of overstrain of the longitudinal arch.

In time adjustment and adaptation may take place so that

the pain ceases, but much can be done to alleviate the pain by the application of heat and suitable padding (see p. 163).

Another very simple device for calcaneal spur is to place in the heel of the shoe a thick pad of sponge rubber, hollowed out at the point which gives the patient most relief. This by itself does not bring relief so quickly as when used in conjunction with suitable strapping.

Occasionally a spur is met with on the posterior aspect of the calcaneum (Fig. 114). This is relieved by a crescent pad fixed in the shoe below the spur. The patient should be warned to allow for this pad in choosing the length of shoe to be worn. If there is acute inflammation the heel of the shoe should be cut away sufficiently to give perfect comfort, and a patch of some elastic material might be inserted. An antiphlogistic dressing may be used, such as Ichthyol with glycerine, weak solution of iodine (see Chapter Twelve).

Fig. 115 shows an exostosis in the space between the first and second metatarsal heads. It was probably due to osteo-arthritis. It was treated with metatarsal strapping and a pad which came well over the heads of the second, third, and fourth metatarsals. After the pain had subsided and the most comfortable position was ascertained for the pad, it was fixed to an insole. This patient had several years' comfort although he was aged 79 when the treatment was first applied.

PERIOSTITIS

PERIOSTITIS is inflammation of the periosteum. The periosteum is a soft stricture covering the bones, very sensitive and easily injured. The bone receives its nourishment in part through the periosteum, and any long-continued inflammation of the latter may lead to serious consequences. In the foot it may occur wherever a bone has been subjected to injury which is severe, yet not sufficiently severe to cause a fracture. Long-continued friction from ill-fitting shoes may produce it at the apex of one or more toes or the back of the heel, or on any of the more prominent points. Continued irritation may give rise to an exostosis.

Overstrain of a tendon may cause a periostitis at its junction with a bone for example where the pull of the plantar fascia is associated with painful heel or calcaneal spur

Periostitis also occurs in patients who suffer from such infections as typhoid gonorrhœa or rheumatism Its treatment should be in the care of the regular medical adviser The chiropodist may render first aid by using some antiphlogistic dressing such as painting with *iodine mistis* and a pad to prevent further injury or a strapping to limit movement.

OSTEOMYELITIS

OSTEOMYELITIS is a suppurative infection of bone marrow It frequently occurs in the femur or tibia but may affect any bone It is sometimes found in the phalanges, especially after a slight injury It is caused by toxic products conveyed in the blood stream from some focus at a distance It is extremely painful

In the acute stage the infection travels along the marrow spaces and eventually produces a subperiosteal abscess If this is neglected it will discharge through the skin The bone usually becomes necrosed and a small piece of dead bone or sequestrum is thrown off After the acute stage is passed there may be a chronic stage which is generally caused by the sequestrum not being entirely separated thus preventing healing

BRODIE'S ABSCESS is a localised relapsing type due to a less virulent infection

Osteomyelitis is always a *dangerous* condition which must be under medical supervision Its seriousness is apt to be overlooked as when it occurs in a toe it may be mistaken for a corn with suppuration In the latter the inflammation is in the soft tissues whilst in the former palpation of the toe will reveal a tenseness round the bone

The history of the case should always be carefully taken and the chiropodist should be suspicious of a sudden acute inflammation in a toe after tonsillitis or similar pyogenic

infection When the condition is suspected the opinion of a doctor should be sought at once

ACROMEGALY

ACROMEGALY means enlarged extremities It is a condition due to glandular disease and must always be under medical care It is of interest to the chiropodist when the bones of the foot are involved and become enlarged Suitable padding gives great comfort to the patient Each case must have padding specially designed to suit its own irregularities.

POLYDACTYLISM

Fig 116, 117, 118, and 119 show an interesting group of three generations of POLYDACTYLISM, that is, supernumerary toes Figs 116 and 117 show the feet of the grandmother aged 51, Fig. 118 is her daughter aged 33.



Fig. 116

Fig. 117

Figs 116 and 117 show polydactylism, first generation

and Fig 119 the granddaughter aged 10. The polydactyly is evidently receding and the family feet returning to



FIG. 118

Polydactyly, second generation. There was
H. disease in both feet several metatarsals

normal. The grandmother stated that the two generations
previous to hers were normal, but that her "great-grand



FIG. 119

Polydactyly, third generation. After r
extra fifth toe on right foot

mother had an extra toe. The child's extra
most successfully.

SYNDACTYLISM

Figs 120 and 121 show the opposite characteristic—SYNDACTYLISM—that is, too few toes. The patient, a man of 28, was in no way hampered by his lack of toes. He was an



Fig. 120

Ankles of man with syndactylism as shown in Fig. 121

athlete and called on the chiropodist to have treatment for the left ankle which he had sprained in jumping. There was no family history to be obtained.

Figs 122 and 123 show the feet of a child



FIG 121

Syndactylism in feet of man aged 28



FIG 122

FIG 123

Showing syndactylism.

CHAPTER SEVEN

CONDITIONS AFFECTING THE CIRCULATION

BLOOD CIRCULATION DISORDERS all come within the province of the doctor, who should be notified whenever the chiropodist suspects some irregularity. For a full description of these conditions the chiropodist must refer to his medical textbooks, but some types occur so frequently that a few reminders are given here.

The following will be mentioned .—

Acrocyanosis.

Varicose Veins.

Phlebitis.

Chilblain.

Erythrocyanosis.

Œdema.

Gangrene.

Arteriosclerosis.

Thrombo-angiitis obliterans.

Intermittent Claudication

Raynaud's Disease.

Circulatory disturbances may be due to several distinct causes —

Insufficient Blood Supply.

Cardiac Weakness.

Anæmia.

Diseases of Blood-vessels.

Faulty Innervation.

Frequently there is a combination of causes

ACROCYANOSIS

Acrocyanosis is literally blueness of the extremities. When the feet assume a dark bluish-purple hue it indicates that the return circulation of the blood is dangerously retarded. This retardation may be due to quite a number of causes such as the blocking of a vessel by *emboli* from clots somewhere in the same limb or from the heart; it may be due to *arterio-sclerotic changes*. Acrocyanosis may be the first step towards *gangrene*.

It is a condition which calls for the greatest care on the part of the chiropodist, since if any break occur in the skin healing will be a very slow process. The feet are cold to the touch and liable to chilblain. The patient should be under medical supervision.

VARICOSE VEINS

VARICOSITY is a condition in which the veins become distended and knotty, and the whole area is usually pigmented. For this reason it is very unsightly and patients for merely æsthetic reasons sometimes desire treatment.

The immediate cause in the usual type is a *retardation* of the return circulation of the blood in the lower limb. This may occur in otherwise healthy individuals who have too much standing and is due to a weakening of the blood vessel wall and a deficiency in the valves. There is a type which is due to the blocking of the deep veins by a *pelvic pressure* such as a tumour or pregnancy.

In all cases the patient must be referred for medical advice. When adhesive strapping has to be applied to such a case the greatest possible care must be exercised to prevent irritation of the varicose area by the strapping. If any irritation or bruising takes place it is difficult to heal and ulceration may be the result (see p. 78).

PHLEBITIS

PHLEBITIS is an inflammation of a vein and is often associated with varicose veins. Usually there is a history of trauma to a distended vein so that a small clot is formed in that area. If the part is devitalised from long stagnation (as in varicose veins) infection may take place and unless treated immediately may spread up the limb.

Sometimes the condition is a complication of childbirth.

The signs and symptoms are pain over the vein which may be felt as a hard, tender cord running upwards and often the skin over the vein is reddened and œdematous.

The condition is not without danger as a piece of the clot

may break off and travel upwards to plug a vessel in the lungs, which may cause the death of the patient.

The treatment is to put the limb at rest by firm bandaging and send the patient home to bed to await medical attention.

CHILBLAIN

CHILBLAIN (*erythema pernio* or *chimatlon mild*) is an epidermal inflammation resulting from continued exposure to severe cold, with or without dampness. If deeper layers are affected it is *chimatlon* severe or frost-bite. In the mild type the chiropodist can give great comfort, but in any case the doctor should be consulted so that the patient may have the benefit of constitutional remedies (see p. 79).

Pathology —When the extremities become chilled the skin capillaries contract to conserve the body heat. If this spasm is continued sufficiently long the capillary wall is damaged in such a fashion as to permit leaking when the blood flow is resumed. Red blood cells and serum exude into the per-capillary tissue spaces to give rise to the well-known red, shiny swellings known as chilblains. They are most likely to occur in those parts of the body most easily chilled, partly by being farthest from the warm centre of the body and partly by being exposed to the air, e.g., toes, heels, fingers, nose, ear-lobes.

Signs and Symptoms —The part is swollen and shiny, the colour varies from bright red to deep purple; there is burning and nearly always an intense itching. If the epidermis should be abraded there will be ulceration which is slow to heal.

Treatment —The patient should have constitutional treatment from the doctor to improve the general circulation. Locally the aim is to reduce the exudation and to keep the surface dry and unbroken.

Contrast foot-baths are to be advised in an early case if there is no gross damage to the blood-vessel walls. Place the feet in warm water and raise the temperature of the water till it is as hot as can be borne comfortably. Then plunge the feet into cold water and return to the very hot

Continue this alternation from hot to cold and from cold to hot for ten minutes, keeping the feet in the hot about ten seconds and in the cold about three seconds each time. It is important to keep up the temperature of the hot water all the time. This treatment should finish in the cold water be carried out at home by the patient at least twice a day drying very carefully afterwards and powdering thoroughly with talcum.

The chiropodist might give a treatment of radiant heat, rubbing in some stimulating ointment, e.g. iodine ointment. The foot must be finally left quite dry and powdered.

Owing to the sodden condition of the skin ointment dressings must be used sparingly but stimulating preparations of iodine or tinct. benz. co. are suitable on unbroken surfaces. Mustard oil rubbed in gently till dry gives good results. Co. unguentum methyl salicyl is also to be recommended (see also the section on Drugs and Dressings).

When the chilblains are broken the patient should always be advised to consult a doctor, and the very strictest aseptic precautions must be observed as, should infection take place there is very little power of resistance in the tissues. Mild antiseptic ointment can be used—T.C.P. has been found very useful also 10 per cent. Ichthyol.

Sometimes a powder such as iodoform or a mixture of 1 part iodoform in 6 parts boric powder or B.F.I. is to be prescribed but care must be taken to prevent these powders forming an irritating crust.

Protective pads are sometimes very helpful, but these should never be adhesive. Animal wool is often found to be irritant.

Preventive Measures—Patients subject to chilblains should be warned against over using hot foot baths as these produce relaxation of the tissues. They should not sit close to the fire immediately after coming in from frost. It is good to warm the feet *slowly* and thoroughly at the fire but only if the shoes are first removed. If the latter are kept on when the feet are warmed there is not sufficient room for swelling to take place and the result is injury to the tissues.

Weak solution of iodine will dispel early congestion. It may be painted on daily for three consecutive days if the

patient has no idiosyncrasy to it. The strong solution might be used once a week.

Woollen stockings are not always advisable, as wool is an irritant, and also the stockings are liable to shrink when washed. Two pairs of hse thread or silk may be worn if necessary, for warmth.

Thorough powdering will keep the feet warm and dry, and this treatment is the most effective of all as a preventive measure.

Rubber shoes and varnished leather are not to be recommended as they tend to keep the feet moist owing to lack of ventilation.

ERYTHROCYANOSIS

ERYTHROCYANOSIS is a condition often associated with chilblains and is due to bad circulation and a chilling of the lower parts of the legs. It is found almost exclusively in women and may be caused by a considerable length of leg being exposed to cold air.

The condition manifests itself as a reddish and purplish blotching of the legs, chiefly round the ankles. Sometimes the ankles swell since the capillaries become damaged either through being unable to function properly or having an inadequate blood supply—the supply being diminished because of the cold and maybe because there is some systemic cause of poor oxygenation. *e.g.* anæmia.

Treatment is by prevention of the chilling through wearing adequate clothing. The patient's general health should be built up so that her circulation and skin are in the best possible condition. Cod-liver oil rubbed into the area daily over a prolonged period will make the area symptom-free.

ŒDEMA

ŒDEMA is excess fluid in the interstitial spaces and occurs in any condition in which the body tissues retain fluid. It appears first usually at the ankles, and its presence can be detected by the fact that it "pits" under pressure. Such cases should be referred to the doctor forthwith.

There are three main types —

- 1 Vascular Œdema
- 2 Back-pressure Œdema
- 3 Renal Œdema.

1 Vascular Œdema results from damage to the retaining cells of the blood vessel walls, which allows fluid to percolate out. This also occurs in inflammation but can be distinguished from it because true œdema is affected by gravity, whereas inflammation tends to remain localised.

2 Back-pressure Œdema occurs when the pressure in the venous system rises beyond a certain point. This may be caused by the following —

- (a) Anything obstructing a vein such as a tumour, pregnancy, tight garters, or phlebitis with thrombosis. (This latter will also give rise to varicose veins.)
- (b) In congestive heart failure the blood accumulates in the venous system as the heart is unable to fulfil its normal task of maintaining the circulation. This type of œdema is very much affected by gravity and is found chiefly in the lower limbs especially towards night time after a long day of standing up.

3 Renal Œdema is due to retention of water in the body because of kidney disease. It is not affected by gravity quite so much as the cardiac type and swelling occurs characteristically in the lower eyelid after a night's rest.

Care must be taken to distinguish between true œdema and certain other swellings which might be mistaken for it. The most common of these is myxœdema or 'waxy swelling'. Myxœdema is characterised by a thick lining of fat deposited under the skin and does not pit on pressure. As far as the chiropodist is concerned the place he is most likely to see this fat is just under the skin on the dorsum of the foot. This disease is due to thyroid gland dysfunction and the patient should be recommended to visit his doctor.

GANGRENE

GANGRENE is death of the tissues and may result when the blood supply is reduced, and certainly when the supply is completely cut off. It is a condition sometimes encountered in chiropody, but it is a danger against which the student must be ever on the alert. He must be thoroughly conversant with its appearance and causes, which can be studied only in a textbook of Pathology or Surgery. When it occurs, it does so more frequently in the foot than elsewhere.

There are three distinct types of gangrene, known as —

- (a) Dry Gangrene.
- (b) Moist Gangrene.
- (c) Gas Gangrene.

In **dry gangrene** the fluids in the tissues are gradually drained away, as no further blood is reaching the part. The area is at first red and painful, and then becomes black and mummified. A line of demarcation slowly appears between the dead and living tissues.

In **moist gangrene** there is putrefaction instead of mummifying, and there is no well-marked line of demarcation; that is to say, the disease tends to spread. This type of gangrene is the result of bacterial contamination.

Gangrene will take place when the blood supply to the part is cut off, and a number of causes will lead to such a state of affairs. These causes may be divided into two broad groups —

- 1 Trauma.
- 2 Systemic Disease.

(1) Amongst traumatic causes may be direct injury, an *embolism*, or a *ligature*, all of which may lead to vascular occlusion and thereby prevent the blood from nourishing the part.

Carbolic Gangrene is a sloughing of the tissues following the use of an over-strong application of phenol.

(2) Systemic causes include —

- (a) Arteriosclerosis.
- (b) Thrombo-angitis obliterans.
- (c) Raynaud's Disease.
- (d) Diabetes.

(a) **Arteriosclerosis** is usually associated with old age and the type of gangrene associated with it is often termed *senile gangrene*. It is a progressive hardening of the walls and narrowing of the lumen of the vessels with consequent reduction of the blood supply to the part. It takes place over a long period. A similar arterial condition is found in younger people (35 to 50) who have at some time or another had syphilis.

(b) **Thrombo-angiitis obliterans** is an inflammation in the artery and is generally accompanied by *intermittent claudication* i.e., intermittent limp. The patient can walk only a very short distance comfortably and then he is seized by a sudden pain, generally in the calf and has to rest for a minute. After that he can walk another short distance say a hundred yards, and then has to rest again. The cause of the pain is a temporary diminution in the blood supply, and the short rest restores it to normal and allows time for the removal of waste products which have accumulated and which could not be removed on account of the inadequate blood supply. The etiology of the arterial inflammation is unknown.

(c) **Raynaud's Disease** is a disturbance of the vasomotor system. The local symptoms in the feet are similar to severe chilblain and may lead to *ulceration* and eventual *gangrene*. The dilatation and contraction of the blood vessels which should be under nervous control become subject to spasm, at times the blood supply to the toes is completely cut off, and the part becomes white and dead looking. When the spasm yields, the colour changes to deep blue-black and when the circulation becomes normal there is intense pain. The local symptoms are relieved by reflexly dilating the blood vessels. This is achieved by placing in warm water some other part of the body than the limb affected. The case is one for the surgeon as it is materially helped and sometimes completely alleviated by the operation known as sympathectomy which consists in severing the autonomic nerves relating to the part. This results in leaving the arteries permanently distended so that the maximum circulation is always present.

(d) **Diabetic Gangrene** is found in diabetic patients who have attained middle-age. In such persons the arteries are

always diseased (atheromatous changes taking place in the vessel walls) and the blood supply is very poor. Hence any slight injury to the foot is difficult to heal. If bacteria gain entrance the gangrene spreads rapidly and is of the moist type. There is much swelling with *œdema*, and sometimes the toes have a *duty blistery* appearance (see Fig 83).

Gas Gangrene is a case for the surgeon and should be immediately handed over to him. It is characterised by being moist, black, having bubbles of gas which can be palpated by the finger and heard to crackle, and also has a very foul smell (like that of decomposing meat). It is not likely to be met with in general chiropody practice except in country districts where the skin of the foot has become broken, allowing the entry of some of the gas gangrene bacilli, which are usually plentiful in manured land, *e g*, a ploughman scraping his foot with a manure fork might become infected.

CHAPTER EIGHT

CONDITIONS AFFECTING THE NERVES

THE following will be mentioned —

- 1 Neuralgia.
- 2 Neuritis
- 3 Neuroma.
- 4 Paralysis

Neuralgia is pain in a nerve and is chiefly interesting to the chiropodist when it occurs in the anterior metatarsal area. It is a medical condition and should be referred to the patient's doctor.

Neuritis is inflammation of a nerve. This inflammatory reaction may be the result of an infection or rheumatism or systemic poison, e.g. alcohol, lead or mercury. For more detailed classification the student should consult a textbook of Neurology.

Occurring in the toes or anterior plantar surface the symptoms may be first of all tingling and later on, pain (stabbing or aching) which tends to shoot forward to the tips of the toes. The pain follows the line of the nerve and is aggravated by pressure or voluntary movement. It is alleviated by rest and warmth. It is essentially a case for the medical adviser.

Neuroma (tumour of a nerve) may occur anywhere. A small pea like growth may be felt under the epidermis, and it is intensely painful to the touch. Should it occur in the neighbourhood of a proximal phalanx the patient will complain that the pain shoots to the tip of the toe. The treatment is surgical.

Paralysis means loss of muscular power and may affect either —

- (a) Part of a limb or
- (b) A whole limb

Such conditions are chiefly of interest to chiropodists because of the accompanying trophic changes in the skin. Patients suffering from these often come to a chiropodist imagining that they have a simple callous patch. If its true nature is not recognised and adequately treated, slow-healing ulcers or more serious septic sloughs may follow. The *correct treatment* is to refer the patient to a doctor forthwith, and meantime apply a suitable protective pad and antiseptic lubricant dressing (see Trophic Ulcer, p. 78).

(A) **Part of a Limb.**—When certain groups of foot and leg muscles are affected the resulting deformity is known as **talipes** with all its varieties. When one muscle loses its power and fails to act, healthy muscles continue to act and, being unopposed, draw the foot into a crippling position. The symptoms are sometimes very slight and apt to be mistaken for some unimportant local disability.

The various types of **talipes** are —

Talipes equinus.—The heel does not reach the ground, owing to paralysis of the extensor group of muscles, causing contraction of the calf muscles.

Talipes calcaneus.—Only the heel reaches the ground, the forefoot being dorsiflexed, owing to paralysis of the flexor group of muscles with consequent contraction of the extensors.

Talipes varus.—The patient walks on the outer edge of the foot, owing to paralysis of the peronei tendons with contraction of the tibialis anterior and posterior.

Talipes valgus.—The patient walks on the inner side of the foot, owing to paralysis of the tibial muscles and contraction of the peronei.

The equinus and calcaneus forms may be combined with either the varus or the valgus forms. Thus we have talipes equinus varus, talipes equinus valgus, talipes calcaneus varus, talipes calcaneus valgus.

All of these types may be either *congenital* or *acquired*. If acquired, then the cause may be trauma or some disease such as *anterior poliomyelitis*.

Talipes in all its varieties should have surgical treatment at the earliest possible moment. Frequently cases are

referred to the chiropodist by the doctor for the care of callous spots

Fig 82 shows a case of *talipes calcaneus* following on *acute anterior poliomyelitis*. There had been a trophic ulcer on the heel for about three years when the patient voluntarily came to the chiropodist. After surgical consultation the chiropodist was asked to take care of the foot.

B A Whole Limb—Such paralysis may be —

- (a) Flaccid when the lower motor neurone is affected
- (b) Spastic, when the upper neurone is affected

(a) FLACCID TYPE OF PARALYSIS

1 Acute Anterior Poliomyelitis—This is often called infantile paralysis, though it is not confined to children. It is a disease of the anterior horn cells of the spinal cord due to an acute infection. Thus the paralysis is of the lower neurone type. When a pathological change has taken place some muscle or group of muscles fails to receive motor impulses and thus becomes paralysed. As a result *atrophy* sets in and the part becomes deformed and flaccid. Should the infection be arrested before complete destruction of the cells in the spinal cord has taken place some recovery will follow.

2 Club Foot.—This is a *congenital* deformity and may be described as *talipes equinus varus* to a greater or less extent. It is generally corrected surgically shortly after birth.

3 Local Paralysis—This would result from the severance of a nerve in the limb.

(b) SPASTIC TYPE OF PARALYSIS

1 Congenital Spastic Diplegia—The patient has an adduction deformity and if he walks at all he has a typical scissors gait.

2 Tabes dorsalis.—This disease is syphilitic in origin and has widespread sensory disturbances as well as motor dysfunction.

3 Disseminated Sclerosis—Paralysis is a late manifestation of this disease but a shuffling unsteady gait is to be found earlier.

4. **Hemiplegia.**—This is spastic paralysis of the whole of one side of the body which is due to cerebrovascular damage (cerebral hæmorrhage, clotting, or embolism)

5. **Spina bifida.**—This is a congenital defect of the spinal column which may occasionally produce paralysis. At birth one of the vertebræ is not fully developed so that the spinal cord has not a complete bony covering. This occurs usually in one of the lumbar vertebræ. The defect may be very slight—when no adverse symptoms may follow—or it may be so severe that the spinal cord may bulge out.

It is of interest to the chiropodist, because it may be the cause of pes cavus or of an ulcer in the foot, which is exceedingly difficult to heal.

CHAPTER NINE

CLINICAL PROCEDURE

IN order to become a successful private practitioner it is not sufficient to be careful only about the actual operative procedure. The orderliness or otherwise of the waiting room creates the first impression on a patient, and abruptness of manner in making a telephone appointment may cause an unfavourable bias in his mind.

Whilst a patient is being treated he should be made to feel he is of paramount interest to the chiropodist. No matter how harassed by other importunate people, the chiropodist should never even seem to be 'hurrying a patient out to get on with another'. However quickly he works, his manner should always suggest quiet steadiness, as this is the surest way of beginning to give comfort to a patient who is probably worried and tired already.

EXAMINATION OF PATIENTS

When a patient first applies for treatment to a chiropodist, the latter has three means of observing—he can look, listen and handle. He should notice how the patient enters the room and stands for a moment, as the gait is then not quite so self-conscious as when under formal examination. The shoes and stockings should be examined for effects of perspiration and of malfitting and for the stresses of wear and tear. Then the foot should be looked at while the patient describes his symptoms. Notice the position in which the foot hangs or lies. Observe the shape of the arches at rest. Then notice any alteration in shape under weight bearing. Finally handle the foot carefully and ascertain its mobility generally as well as noting particularly the condition of the ankle joint, the subastragaloid, the mid tarsal and the metatarso-phalangeal joints whilst the patient walks.

The patient may only ask for relief from a soft corn between the fourth and fifth toes, but the chiropodist's aim is to effect a permanent cure by removing the cause. This will probably be achieved by re-aligning the head of the fourth metatarsal. The whole foot and, indeed, the whole body should be considered every time, no matter what part of it is the immediate trouble.

So many serious affections have symptoms in the feet that the student of chiropody must learn to *examine* in a methodical manner. If examination is attempted in an irregular or haphazard fashion it is quite easy to overlook some important feature. The following order of noting the important points has been in use for some years and has proved serviceable. After noting the patient's sex, age, occupation, previous health, and general condition of body (*e.g.*, over-stout, anæmie, etc.), proceed with the details of the foot, taking the larger features first.—

1. **Position and Shape of Foot.**—Is the position normal or inverted or everted, adducted or abducted? Is the foot long and narrow, or short and broad, extra thin or flabby?
2. **Shape of Arches.**—
 - (a) Longitudinal
 - (b) Transverse
3. **Bones and Joints.**—Hallux valgus or rigidus, crepitus or hammer toes, etc.
4. **Muscles and Tendons.**—Flabby or contracted. Range of different movements, active and passive.
5. **Blood Circulation.**—Is the foot hot or cold or damp? Is the colour normal or purple or blue? Is the pulse faint? Are the veins varicose?
6. **Skin Conditions.**—Corns, verruæ, etc., skin eruptions (their type), abnormal nails.
7. **Discharges.**—Perspiration, pus, hæmorrhage.

When the chiropodist has become habituated to noting all the details in this (or any other regular) order, he will more readily recognise which are the non-simple cases which he must not attempt to treat.

RECORD-KEEPING

When a chiropodist first starts in practice for himself if he is wise he will get in touch with a trained Accountant and find out what records of his practice must be kept to satisfy the Commissioners of Inland Revenue. Early attention to this detail will save much worry later on.

Before this however he must decide how to keep his professional records. He should not trust details of cases to his memory but have a written account of every treatment. He will find the card index the best in the long run. It may seem wasteful to use a new card for a patient who may never return for a second treatment but patients are more likely to return for subsequent treatments to practitioners who are 'up to date' even in their clerical work.

The card illustrated has been in use for more than thirty years, and the list of classified foot affections with contracted symbols has been compiled at The Edinburgh School of Chiropody.

CLASSIFICATIONS

I SKIN		(4) Other Skin Lesions	
	(1) Helomata	S/D	Dermatitis
S/Hd	Heloma durum	S/F	Fissure
S/Hmi	Heloma miliare	S/Hk	Hyperkeratosis
S/Hmo	Heloma molle	S/Hg	Hypergranulation
S/Hv	Heloma vasculare	S/Im	Impetigo
S/Hnv	Heloma neurovasculare	S/M	Mycosis
		S/P	Pompholyx
		S/Ps	Psoriasis
	(2) Verrucae	S/S	Scabies
S/Va	Verruca arida	S/Ss	Sinus
S/Vh	Verruca humida	S/T	Tinea
S/Vv	Verrucosity	S/Ty	Tylosis
		S/OL	Other Skin Lesions
	(3) Ulcers		
S/UD	Diabetic Ulcer		II NAILS
S/UP	Perforating Ulcer	O/Au	Onychiauxis
S/US	Simple Ulcer	O/C	Onychocryptosis
S/UT	Tuberculous Ulcer	O/Ex	Subungual Exostosis
S/UTr	Trophic Ulcer	O/C	Onychogryposis
S/UVar	Varicose Ulcer	O/H	Subungual Heloma
S/UVen	Venereal Ulcer	O/Ia	Onychia

Fig 12411. 125

Figs. 124 and 125 show two sides of patient's record card

O/M	Oncchomycosis
O/Ma	Oncchomadesis
O/P	Oncchophosia
O/Par	Paronychia
O/Pt	Oncchoptosis
O/Rr	Oncchorhexis
O/S	Sensitive Sulcus
O/T	Tinea
O/Tr	Oncchatrophia
O/V	Involved

III CIRCULATION

C/A	Anemia
C/Ac	Acrocyanosis
C/C	Chilblains
C/C	Cangrene
C/Ilv	Hypervemia
C/IC	Intermittent Claudication
C/Ph	Phlebitis
C/O	Edema
C/R	Raynaud's Disease
C/V	Varicose Veins
C/AS	Arteriosclerosis

IV NERVL CONDITIONS

N/Ag	Analgesia
N/N	Neuritis
N/O	Neuroma
N/P	Polionychitis
N/Pn	Peripheral Neuritis
N/Sp	Spastic Paralysis

V GLANDS

(Sudoriferous)

GSd/A	Anidrosis
GSd/B	Bromidrosis
GSd/C	Chromidrosis
GSd/Ilv	Hyperidrosis
G/Sb	Gland (Sebaceous)

VI BONY

B/DF	Dancer's Fracture
B/Ex	Exostosis
B/ExCal	Exostosis Calcaneal
B/ExSub	Exostosis Subungual

B/F	Fracture
B/K	Köhler's Disease
B/MF	March Fracture
B/Omv	Osteomyelitis
B/Per	Periostitis

VII MUSCLE TENDON AND OTHER CONDITIONS

MT/B	Bursitis
MT/C	Contraction
MT/Dfl	Dorsiflexion
MT/C	Canglion
MT/OC	Oblique Contraction
MT/Pfl	Plantar Flexion
MT/R	Rotation
MT/S	Synovitis
MT/Ts	Tenosynovitis

VIII JOINTS

J/Ad	Adhesions
J/Ak	Ankylosis
J/DR	Hammer Toe
J/HF	Hallux flexus
J/HH	Hallux rigidus
J/HV	Hallux valgus
J/HVr	Hallux varus

IX ARCH

(Longitudinal)

AL/PC	Pes cavus
AL/PP	Pes planus

(Anterior)

AA/D	Depression
AA/M	Metatarsalgia
AA/Mort	Morton's Toe

X DIABETES

D	Diabetes
---	----------

XI RHEUMATISM

R/F	Fibrous
R/J	In Joint

II GENERAL TERMS

Acquired
 Amputation
 Anæsthesia
 Atrophy
 Both feet
 Congenital
 Crepitus
 Eversion
 Child or Children.
 Flaccid
 Foot-strain
 Painful Heel
 Inflammation
 Inversion
 Left foot
 Right foot

Nec	Necrosis.
Pus	Suppuration
R/CS	Referred to Consult- ing Surgeon.
R/CP	Referred to Consult- ing Physician
R/GH	Referred to General Hospital.
R/M	Referred to Medical Attendant
R/O	Referred to Ortho- pædic Clinic.
Shoes	Shoes.

> Improvement
 < Worse.
 = No change

CHAPTER TEN

PADDING AND STRAPPING

THERE are three materials most commonly used in chiropody for padding—felt animal wool and sponge rubber also buckskin and chamois leather

The most convenient material for making pads is felt This is manufactured in thicknesses varying from $\frac{3}{8}$ to 1 in and also in three textures—soft semi compressed and compressed It can be obtained either plain or spread with adhesive backing The adhesive may be diachylon or emplastrum saponis (soap plaster) or rubber This last is apt to be irritant but a rubber adhesive combined with zinc oxide has been produced which is very satisfactory in use To the large majority of patients it is non irritant it retains its shape and position and is not readily washed off

Animal Wool, as used in chiropody has several advantages It is non absorbent and in consequence can be worn in definitely It is easy to make any required shape or size of pad quickly The pad once properly applied adapts itself readily to the foot and footwear The wool can be had in different varieties It may have long or short staples and it may be parallel-combed or otherwise The writer much prefers the long staple without parallel combing

One drawback to its use is that in a small percentage of cases the natural wool is a skin irritant

The greatest danger incurred in its use is that wool shrinks when wet and rubbed If this takes place round a toe it may lead to *strangling* of the toe and in a diabetic patient *gangrene* might supervene very quickly To obviate this the wool should never be wound tightly round and round a toe it should be lapped gently over and round and under three or four times

In making a pad for a small toe a long strand of 8 to 10 in should be selected It may be divided for about half its length and the remainder rolled into a pad more or less

tightly according to the thickness required. The pad should then be placed in its position and the ends wrapped round both toe and pad. A similar pad can be used for a hallux valgus joint, a hammer toe, or even as a metatarsal prop.

Sponge Rubber is well adapted for chiropodial work. It is to be had in varying thicknesses and consistencies, as well as adhesive and non-adhesive. Preparations are also on the market which the makers claim are non-irritant to the skin. They are chiefly useful for attaching to the insole of the shoe, or to some sort of "cuff" which can be worn and removed and replaced daily.

STRAPPING

When a chiropodist refers to strapping he generally means adhesive strapping, although sometimes pads are held in place by an ordinary bandage of gauze or crêpe. Up till the end of last century he had to make his own, as the range of commercial "plasters" was very limited. Nowadays there is a large choice in the matter, and a young chiropodist should remember that there is such a thing as quality and that it pays to buy the best.

If a strapping has to be worn for several days, choose as thin a cotton backing as possible. It will absorb less water in the bath and be less liable to pull away from the foot. It takes a little more skill and a fraction more time to use a fine make than to use a coarse one, but the results justify the effort.

There are different adhesives, those in commonest use are —

1. Soap plaster (*emplastrum saponis*)
2. Diachylon plaster
3. Rubber adhesive, generally with zinc oxide to counteract the tendency to irritate.

Any one of these will give good results, and any one may prove an irritant to certain skins. The writer prefers the Z O rubber adhesive because of its wear-resisting properties.

Should a patient have an idiosyncrasy to plaster, then Friars' Balsam should be painted on the area and rice paper or gauze should be wrapped round the foot (several layers)

before applying the plaster. If there is a slight rash after using it the skin should be well painted with tinct benz eo and powdered. It is, when possible, advisable to have several hours interval between taking off one adhesive bandage and applying the next.

Should a severe plaster dermatitis occur glycerine of starch is a suitable emollient. Patients should always be warned to remove the strapping as soon as any itching is felt no matter how slight.

FUNCTIONS OF PADDING AND STRAPPING

Padding with its co-related strapping has two main functions in chiropody, viz protection and correction.

Protective padding is the more common in non-chiropodial or domestic practice and may consist of practically anything from natural sheep's wool gathered on the hills or pieces of blotting paper to the ready-made ring of felt to be bought in any druggist shop. All of these have certain virtues and may give immediate relief from acute pain but unless they are shaped and applied with due consideration of the underlying structures of the foot they may end in making matters worse. For example consider a hard corn on the dorsum of a flexed interphalangeal joint. If a circular pad be placed, as in the illustration (Fig 120) then the increased pressure on the digital aspect will tend to increase the degree of flexion of the joint, bringing additional internal pressure which will result in an increased cornaceous growth although the first effect of the pad would doubtless be to relieve pressure on the painful surface area.

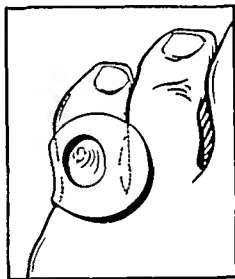


FIG 120

Badly placed circular corn pad.

Thus, in applying a *protective* pad its *ultimate effect—corrective or otherwise—*must be borne in mind.

In some instances a pad is made to be worn continuously until the patient's next visit. Sometimes it is made to be removed and reapplied daily. In deciding which to use, the *patient's mentality* must always be taken into account. The **replaceable** pad has much to recommend it—it can be taken off for bathing, it is not so apt to irritate the skin, it can be washed daily, etc., but some people cannot be bothered with it, and very many more are incapable of putting it on correctly. The simplest replaceable style for the patient to use is a toe-cap of lint or stockinet, with an appropriate pad attached.

Below are illustrated a few suggestions which have been found useful. An ointment or other dressing may be applied with gauze in combination with any of the pads.

- (a) Hallux valgus cap with pad.
- (b) Hammer toe-cap with felt "splint" inside on plantar surface and crescent on dorsum.
- (c) Hallux valgus pad with interdigital wedge—all felt.
- (d) Single splint for hammer toe or interdigital wedge.
- (e) Metatarsal pad with stockinet loop.
- (f) Crescent with wool or elastic loop.
- (g) Crescent with Zopla loop } covered with adhesive
- (h) Crescent with elastic loop } stockinet.
- (i) Z-pad for fifth toe—not replaceable.

An **adhesive** pad is used when it is important that the pad should be worn in the same place for some time. Another advantage is that when used in conjunction with adhesive tape it is nearly always possible to secure additional correction by the particular **tension** of the strapping. Thus, when applying a pad to the dorsum of the fifth toe, notice the position of the toe. It will often be found to have some degree of oblique contraction or rotation, sometimes amounting to subluxation. The Z-pad is particularly useful—the upright acts as a splint, the upper flap passes between the toes, and the lower flap is pulled into a crescent shape for the dorsum. Should there be a corn between the fourth and fifth toes, the inner flap of the pad must be adjusted accordingly. The bevelling (see below) must be very carefully done. Then, if an adhesive strip of tape $\frac{1}{2}$ in. wide be applied round the plantar aspect



FIG. 127

of toe and pulled firmly to the dorsum of the foot, the toe can be assisted to maintain the correct position.

There are certain **broad principles** to be observed in all cases where pads are used :—

1. The pad must be a suitable size (length, breadth, and thickness) and suitable shape
- 2 It must be bevelled all round to a "feather" edge.
- 3 The pad must be correctly placed and, as a general rule, proximal to the part affected.
4. The adhesive used must not irritate the skin of the patient
5. The strapping must not interfere with the circulation
- 6 Neither the pad nor the strapping should limit the movement of the foot adversely.

METATARSAL PAD

There is no one position or shape which is "correct" Both must vary with the shape of the foot and the type of footwear Also, the patient's occupation and usual habitat have a decided bearing on the position of the pad

If the pad is to be "replaceable," it is often made of adhesive felt (with the gauze left on) because of the extra fineness of the rubber Or it may be plain compressed felt or sponge rubber entirely, as the patient prefers

Replaceable pads are used when the patient has a skin intolerant of adhesive, or else after a course of adhesive padding and strapping when the foot has almost returned to normal and it has not been found possible to get ideal shoes

The **shape** of the pad is never symmetrical because the foot is not symmetrical It should follow the general shape shown in Fig. 128. It may require a wing on either side to form a crescent pad protecting the head of the first or fifth metatarsal If the foot is flexible these wings should be dispensed with as soon as possible, as they are apt to interfere with the correct standing position The length of the pad must not come more than three-quarters of the distance to the base of the metatarsals. The width of the pad should be proportional to the true width of the foot not its width

in a splayed-out condition. Also the chiropodist must decide whether the pad should be under all the metatarsals or under the second or third or fourth only. The pad should be bevelled all round especially at the distal end where it comes directly under the heads of the metatarsals.

When the patient is a man (i.e. one who normally wears shoes with very low heels) and when he is walking mostly on level ground then the pad may be placed almost proximal to the heads. When the patient wears high heels or has to walk uphill and downhill frequently it is found in practice more comfortable to have the pad coming slightly distal to the bases of the phalanges. This allows for the different angle of pressure and also for a slight amount of backward slipping in the pad.

METATARSAL STRAPPING

The object of the strapping is not merely to keep the pad in position but to relieve the strain on the ligaments and hold the anterior part of the foot in a more normal position. The chiropodist must try to limit the spreading tendency of the metatarsal heads and re-adjust a possible rotation of the first and fifth metatarsals. At the same time there must be *no limitation of the normal rolling movements* of the metatarso-phalangeal joints.

The patient's foot should be relaxed while being strapped. Commence by putting the strap ($1\frac{1}{2}$ in. wide) round the head of the first metatarsal (immediately proximal to the tuberosity) from the dorsum to the plantar taking care not to interfere with the free movement of the extensor longus hallucis. A firm pull to the plantar surface will tend to correct the axial rotation of the bone, and the strap should be carried across the sole and round the head of the fifth metatarsal. Notice in Fig. 129 how the application of this first strap alters the positions of the toes. If there has been much splaying of the forefoot then there must be a certain amount of wrinkling of the skin on the plantar surface when the strap is bound firmly round. This will do no harm provided the skin is not *nipped* between the pad and the strap. A necessary precaution would be to paint the surface with tinct benz. co first and use a few layers of rice paper on the sole.

of toe and pulled firmly to the dorsum of the foot, the toe can be assisted to maintain the correct position

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3. The pad must be correctly placed and, as a general rule, proximal to the part affected.
4. The adhesive used must not irritate the skin of the patient.
- 5 The strapping must not interfere with the circulation.
- 6 Neither the pad nor the strapping should limit the movement of the foot adversely

METATARSAL PAD

There is no one position or shape which is “ correct.” Both must vary with the shape of the foot and the type of footwear. Also, the patient’s occupation and usual habits have a decided bearing on the position of the pad.

If the pad is to be “ replaceable,” it is often made of adhesive felt (with the gauze left on) because of the extra firmness of the rubber. Or it may be plain compressed felt or sponge rubber entirely, as the patient prefers

Replaceable pads are used when the patient has a skin intolerant of adhesive, or else after a course of adhesive padding and strapping when the foot has almost returned to normal and it has not been found possible to get ideal shoes.

The **shape** of the pad is never symmetrical because the foot is not symmetrical. It should follow the general shape shown in Fig. 128. It may require a wing on either side to form a crescent pad protecting the head of the first or fifth metatarsal. If the foot is flexible these wings should be dispensed with as soon as possible, as they are apt to interfere with the correct standing position. The length of the pad must not come more than three-quarters of the distance to the base of the metatarsals. The width of the pad should be proportional to the true width of the foot—not its width

in a splaved out condition. Also the chiropodist must decide whether the pad should be under all the metatarsals or under the second or third or fourth only. The pad should be bevelled all round especially at the distal end where it comes directly under the heads of the metatarsals.

When the patient is a man (*i.e.*, one who normally wears shoes with very low heels) and when he is walking mostly on level ground then the pad may be placed almost proximal to the heads. When the patient wears high heels, or has to walk uphill and downhill frequently it is found in practice more comfortable to have the pad coming slightly distal to the bases of the phalanges. This allows for the different angle of pressure and also for a slight amount of backward slipping in the pad.

METATARSAL STRAPPING

The object of the strapping is not merely to keep the pad in position but to relieve the strain on the ligaments and hold the anterior part of the foot in a more normal position. The chiropodist must try to limit the spreading tendency of the metatarsal heads and re-adjust a possible rotation of the first and fifth metatarsals. At the same time there must be *no limitation of the normal walking movements* of the metatarso-phalangeal joints.

The patient's foot should be relaxed while being strapped. Commence by putting the strap ($1\frac{1}{2}$ in wide) round the head of the first metatarsal (immediately proximal to the tuberosity) from the dorsum to the plantar taking care not to interfere with the free movement of the extensor longus hallucis. A firm pull to the plantar surface will tend to correct the axial rotation of the bone, and the strap should be carried across the sole and round the head of the fifth metatarsal. Notice in Fig. 120 how the application of this first strap alters the positions of the toes. If there has been much splaving of the forefoot then there must be a certain amount of wrinkling of the skin on the plantar surface when the strap is bound firmly round. This will do no harm provided the skin is not nipped between the pad and the strap. A necessary precaution would be to paint the surface with tinct. benz. co first and use a few layers of rice paper on the sole.

The second strap should be applied in the opposite direction so as to give the upward pull on the instep. A third and fourth strap—similar to the second—should be used if necessary in order to reach to the cuboid. It is most important that



FIGS. 128, 129, 130, 131

Showing the application of metatarsal pad and half-way strapping. Note the apparently one-sided effect of the pad on the fourth toe. This was intentional in an endeavour to counteract the oblique rotation of the toe. This is the left foot shown in Figs. 9, 10, 11, 12, and 150.

the metatarso-cuboid articulation should be firmly bound, as here there is often a ligament overstrain.

The strapping may or may not cover the dorsum. Ladies with transparent stockings and a finely developed æsthetic sense prefer the strapping to cover the first and fifth metatarsal only. There is also less danger of interfering with the blood circulation, but some of the binding effect is lost.

If there is pronounced dorsiflexion of the toes (see Fig. 132) it is advisable to use a TENSION STRAP or an OBLIQUE STRAPPING before the ordinary metatarsal strapping. For a tension strap use two or three strips—sufficient to cover the width of the ball of the foot with slight overlapping. Place the end of the strips almost at the webbing of the

toes and pull back sufficiently tightly to bring the toes into



Figs. 152 and 153

Showing the effect of "tension" strapping. Fig. 152 is the foot before any strapping is applied. In Fig. 153 note the altered position of the toes after two tension straps were applied as explained on p. 150.

the normal position, finishing the other end on the plantar surface of the heel. This is sometimes sufficient by itself without padding or further strapping, but it is wise to finish off each end with a cover strip placed in transverse position.

OBLIQUE STRAPPING is useful when the toes are much dorsiflexed and the foot markedly inverted or everted. It must be decided whether or not a plantar pad is advisable, and thereafter a $1\frac{1}{2}$ -in strip is placed distal to the first metatarso-phalangeal joint, brought obliquely across and back to the cuboid, and finished on the dorsum. Another strip is placed on the fourth and fifth heads and carried obliquely to the navicular, again finishing on the dorsum. The tension should be modified to suit the degree of inversion or eversion.

HALLUX VALGUS STRAPPING

HALLUX VALGUS STRAPPING is useful in the early stages of that condition, and even when the trouble is of long standing it can afford great relief so long as it is a mobile case. In a case of extreme deformity surgical procedure is the only way to obtain permanent results. Many people are, however, unable to take the time necessary to render a surgical operation successful, and under these conditions, even in a pronounced case, suitable padding and strapping can give a great deal of comfort. Many variations and modifications of hallux valgus strapping may be devised, depending upon the amount of adjustment necessary or possible in relation to footwear and occupation of the patient.

Before beginning to apply pads, try to ease the joint gently and pull the toe straight forward till it occupies a position as nearly normal as possible. Take a piece of adhesive webbing ("pink elastic") or fleecy webbing or felt $\frac{1}{2}$ in. thick and cut it to about 4 in. by 4 in.

The "stretch" of the elastic should be in the horizontal direction and the rigid pull in the vertical. Cut in the "flask" (Fig. 131) or so-called "butterfly" shape and stretch the flange before applying round the great toe at the distal end of the proximal phalanx. Reinforce it in this position by $\frac{1}{2}$ -in strip of plaster. Place a suitably bevelled crescent pad

proximal to the metatarsophalangeal joint on the medial side, then with one hand manœuvre the toe into the best possible position and with the other hand pull firmly on *b* and manœuvre it also so that it will retain the toe where you wish it. *d b c* should then be stretched laterally and adhered to the foot and kept in position with straps as for metatarsalgia either with or without a metatarsal pad—generally with it.

The position of the neck *c* must be decided appropriately to each particular case by the particular direction required by the tension. The important point is that *a* must not pull on the distal phalanx as

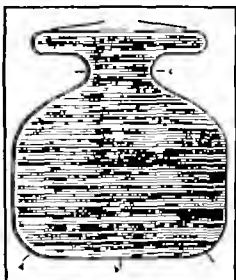


FIG 134



FIG 135

FIG 136

FIG 137

Figs 135 136 and 137 show the different steps in hallux valgus "butterfly" strapping

this would eventually cause flexion at the interphalangeal joint, and thus nullify the tension on the valgus joint.

Figs 135 136 and 137 show the padding and strapping applied to the same foot shown in Figs 9 10 11 and 12. The two latter show the favourable results obtained

In some cases it is not desirable to use this elaborate style of strapping—it may fill the shoe too much, or it may require to be removed daily to avoid irritation. In these cases, when the hallux joint is mobile, a simple TENSION STRAP may be used.

Place a $1\frac{1}{2}$ -in wide strip along the medial length of the great toe, reinforcing it by a $\frac{1}{2}$ -in strip round the first phalanx. Pull the toe straight forward and re-align the metatarsophalangeal joint. Holding it in this position the first strip should be pulled tightly back and round the heel to the lateral side of the calcaneum. If necessary a crescent of felt could first be placed proximal to the head of the first metatarsal. In cases where the patient wishes to apply this at home every day the strap may only be taken back to the navicular.

WEAK FOOT STRAPPING—"STIRRUP AND SPUR"

In the initial stage of weak foot (*i.e.*, when the shape of the arch is maintained although severe pain is felt when walking) adhesive strapping properly applied can give the very greatest assistance. It enables the patient to continue his usual daily programme in comfort, and, in addition, prevents further injury from malposition. The "stirrup and spur" interlaced design is the most useful.

For a small foot use 1-in strapping, for a man's foot $1\frac{1}{2}$ in is better.

The leg should be at rest with the knee straight, and the foot at right angles to the leg and quite relaxed. Be sure that the foot is in a good position—neither inverted nor everted—and maintain this position by the application of the first strap.

Place the middle of the first strap at the tuberosity of the heel just at the insertion of the Achilles tendon. Bring it forward on each side as far as the heads of the first and fifth metatarsals.

The middle of the second strap should be on the plantar surface of the heel and should come up posterior to the malleoli and extend 2 or 3 in. above them.

The third strap is similar to the first but higher up and overlapping it $\frac{1}{4}$ to $\frac{1}{3}$ in and about $\frac{1}{2}$ to 1 in. shorter at each end.

The fourth strap is immediately anterior to the second, with slight overlap

Continue these strappings alternately until the malleoli are covered by both "stirrup and 'spur" This will probably require one more "spur" than "stirrup"

There should be *no special tension* on any of the straps as the aim is to retain the shape of the foot, thus taking the strain off the ligaments When the foot is thus held together

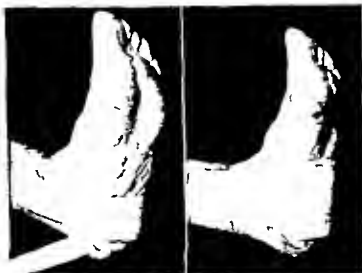


FIG 138

FIG 139

Showing the different steps in weak foot strapping—
"stirrup and spur"

painlessly the muscles are enabled to function properly and so recover their lost tone

It is *essential* that the *normal movements* of the foot should not be interfered with, so the strapping should not restrict the tibialis anticus or the long extensors

Be careful that the strapping lies evenly over the fully extended tendo Achillis

This strapping is also useful in cases of sprained ankle.

PERONEAL STRAPPING

PERONEAL STRAPPING gives support and comfort in many different foot weaknesses When it has been correctly applied it looks a very simple dressing but in

reality it is a complete test of the chiropodist's skill. It gets its name from the fact that it should keep the **peroneal** in its place above the **external malleolus** and again at the **cuboid**. Hence it is useful in a case of "slipping peroneal" when, probably as the result of a severe sprain, the **peroneus longus** has been torn from its notch and remains unattached, thus allowing the ankle to "turn" and invert the foot.



FIG 140

In addition the strapping should keep the **navicular** in its proper alignment and also prevent splaying out of the



FIG 141



FIG 142

Figs 140, 141, and 142 show the different stages in "peroneal" strapping

metatarsals. This is of the greatest possible assistance in anterior weak foot and incipient pes planus.

Figs 140, 141, 142 show the method of application. Attach a strip of 1-in. plaster just under the internal malleolus and bring it round the insertion of the tendo Achillis obliquely

to catch the peroneus longus just above the external malleolus. Then *without tension*, cross the dorsum to the navicular and still without tension cross the plantar to the neck of the fifth metatarsal cross the dorsum to the first metatarsal, and obliquely across the plantar to the cuboid. Finish the strip of plaster where it began under the internal malleolus. Be careful not to rotate wrongly the navicular or the cuboid. Wherever the plaster touches the dorsum there should be a *thin layer of wool* to allow the extensors and the tibialis anterior to function freely.

BOW STRAPPING

BOW STRAPPING is one method which may be used when it is desired to take some of the strain off the plantar fascia as in *pes planus* or *calcaneal spur*.

Two strips of adhesive plaster are required sufficiently broad to cover the plantar anterior metatarsal area and



FIG 143



FIG 144

Showing the different steps in "bow" strapping

long enough to reach from the base of the toes, under the heel, and up to the insertion of the tendo Achillis. These strips should be put on with sufficient tension to maintain the arch in such a position that there is no undue pull on the periosteum between the plantar fascia and the calcaneum. It will be noticed that the arch of the foot, together with the plaster forms a bow.

The plaster should then be reinforced by a 1-in transverse strip proximal to the metatarsal heads, another from the plantar of the heel up to the malleoli, and a third strip round the insertion of the tendo Achillis. The dressing is completed by further strips of plaster, sufficient to cover the entire plantar surface, and applied alternately on the metatarsal area and the tarsal area until they meet in the instep. It is advisable that the ends of the strips should not meet on the dorsum as they must be pulled tightly enough to make the original strips reach the sole, and this would interfere with the musculature and the blood circulation on the dorsum. If the plaster has been correctly applied it will be found that the distance from the ball of the toes to the ball of the heel is slightly shorter than before, and there is consequently less strain on the plantar fascia.

TARSAL STRAPPING

TARSAL STRAPPING is used when the spring ligament has become relaxed, with consequent lowering of the arch. A *very* thin felt pad is first adhered to the sole under the spring ligament so as to project as far as the medial aspect of the navicular. If this latter rotates under weight-bearing it should be properly adjusted while the pad is being applied. The main function of this pad is to *prevent injury* to the soft tissues from the tightness of the strapping.

The first strap is to be placed over this pad and drawn up the leg on either side about 3 to 4 in. beyond the malleoli. I prefer to use 3-in plaster, but many experienced chiropodists prefer two overlapping straps of 2 in. The foot should be in a plantar-flexed position so as to contract the spring ligament, and the plaster should have sufficient tension to maintain this position.

The second strap (of 3-in plaster) stretches from the back of the heel to the heads of the first and fifth metatarsal, though not covering the two latter. The insertion of the tendo Achillis must first be protected by a thin layer of wool or non-adhesive felt. The middle of the upper edge of the plaster is then fixed to the back of the heel and the strap (upper edge only) brought forward along the line of the dorsum

of the fifth metatarsal, the foot being still plantar flexed. The chiropodist then grips the head of the first metatarsal, his left fingers under the ball of the left foot (right fingers



Figs 145 146 147 148 149

Flat foot strapping— "tarsal" strapping

under right foot) with the thumb between the first and second toes and the fourth and fifth fingers maintaining the base of the metatarsal the internal cuneiform and the navicular in their true alignment. The upper edge of the other end of the second strap is now brought *very firmly* along the inner border

of the foot to the head of the first metatarsal. The plaster is thus applied to the foot by its upper edge only—the lower edge standing out from the foot. It should be slit wedge-fashion at the heel so that the two sides may be wrapped in neatly on the sole. The outer edge should be wrapped first and then the inner edge should be pulled very firmly towards the centre of the sole, remembering that the object is to limit abnormal movement at the subastragaloid joint. The two sides of the plaster should then be secured by a $1\frac{1}{2}$ -in strip of plaster round the metatarso-cuboid and the metatarso-cuneiform joints, then the wedge of plaster at the heel should be folded under and secured.

Finally, the first strip should be detached from both sides of the leg and cut away to the inferior edge of the malleoli. This will allow the foot to resume its normal dorsiflexion.

The first strapping may be worn for a week, subsequent dressings may last for two or three weeks.

IMMOBILISING STRAPPING

This is used in cases of *hallux rigidus* either *arthritic* or *traumatic*. In the former case it hastens complete rigidity, which gives cessation of pain. In the latter case it gives rest, which permits healing and consequent restoration of movement, provided that the injury has not been too severe.

The ultimate success of the dressing depends largely on the fitting of the *first* pad, which is a hard felt wedge. It is to be well bevelled and placed under the first phalanx. It must be sufficiently large to fill completely the hollow of the toe. It generally consists of thick medium-compressed adhesive felt.

The *second* pad is a long strip of compressed adhesive felt, thin or medium thickness. It should be broad enough to cover the plantar aspect of the first metatarsal and reach round and cover the dorsal aspect. It should be long enough to stretch from the middle of the first metatarsal to *exactly* the digital end of the proximal phalanx. It must be bevelled round all the edges and placed in position and fixed by a $\frac{1}{2}$ -in strip of plaster round the interphalangeal joint.

The *third* pad is of adhesive semi soft felt, medium or thick and is an ordinary metatarsal pad (see p 150) Note that the medial bevelling must fit exactly under or over the bevelling of the second pad

When this last pad is in position a $1\frac{1}{2}$ in broad strap must be bound *very firmly* all round the foot immediately behind the metatarsal heads If there is any fear of this restricting the blood circulation animal wool can be placed



FIG 150

FIG 151

FIG 152

Hallux rigidus strapping—"Immobilising" strapping

Fig 150 shows a typical adolescent hallux rigidus. Note the low arch and the prominent first metatarsal head. Note the hollow under the first phalanx of the great toe. This is filled with a hard felt wedge before the larger pads are applied. Fig 151 shows the two large pads in position. The first pad is covered, under the proximal phalanx of the great toe. The second pad—of hard felt—is firmly adhered round the distal end of this phalanx. This pad is levelled to fit on to the metatarsal pad of semi-soft felt. Fig 152 shows the finished strapping.

on the dorsum as a protection. The metatarsal strapping should then be completed (p 155)

This strapping should be worn for a week in the first instance—but the patient should be instructed to return at once if there should be any pain or irritation. If there is any idiosyncrasy against adhesive the skin should be well painted with Friars Balsam and another attempt may be made with plaster over a few layers of rice paper.

Some practitioners cut the second and third pads in one piece. This avoids any misfitting at their junction but the firm felt required to cover the rigidus joint is not always so suitable for the other metatarsals as is a softer felt.

Subsequent strappings may remain on for a fortnight if comfortable. In a traumatic case the joint should have gentle passive movement before applying the next strapping. Possibly two or three applications may be sufficient to render symptom-free a traumatic case of recent occurrence.



FIG 153



FIG 154



FIG 155

Figs 153, 154, and 155 show the stages in building up a prop for a hammer toe.

HAMMER TOE

This condition generally calls for padding both *dorsally* and on the *plantar* surface. The plantar prop takes the form

of a stiff strip of felt to ensure the straightening of the toe, and the dorsal pad is a crescent to protect from the footwear the interphalangeal joints which are thus raised higher inside the toe-cap.

If the toe is completely mobile the plantar prop may consist of a strip of medium thickness harsh compressed felt with adhesive. Care must be taken to have it sufficiently long to fit exactly from the base of the toe to the apex. It should be broad enough to support the whole width of the toe without impinging upon the neighbouring digits. It must be rounded to fit the tip of the toe and have a little of the adhesive removed to prevent irritation at the base of the toe near the web. It must then be secured by $\frac{1}{2}$ in strips of plaster taken obliquely round the toe.

If the toe is rigid or semi-rigid the prop must be bluntly wedge shaped to fit into the hollow curve of the plantar. It is also an advantage if instead of one layer of medium felt, two or even three layers of thin compressed felt are used each layer being a little longer than the preceding one (see Figs 158 154, 155).

The additional layers of rubber thus employed add greatly to the rigidity of the pad thus preventing any further flexion of the toe. As long as the joint capsules of the toe are not hardened there is the possibility of a great degree of amelioration of the condition by persistent padding. The crescent pad on the dorsum should be of soft or semi soft felt, as it is protective not corrective.

The practicability of using animal wool in this connection with a gratifying measure of success must be borne in mind,



FIG 156

The same foot as shown in Figs. 9 10 11 12, 128 129 130 and 131. It shows an adhesive sling between the first and third toes passing over but not adhered to the second.

especially in such cases as show an intolerance of any adhesive dressings (see p. 149)

SLING DRESSING

Another method of dealing with hammer toes is illustrated in Fig 156. This is the same foot as shown in Figs 9, 10, 11, 12, 128, 129, 130, and 131. Here a strip of $\frac{1}{2}$ -in. adhesive plaster is laid on the dorsum of the second toe, adhesive side uppermost. The ends are then taken under and round and over the first and third toes. Finally, the adhesive on the second toe is covered. The advantages of this strapping are that it takes practically no room in the shoe and allows all the toes to have normal freedom of movement—only the third can no longer curl under the second. The process could be reversed if the second had been underlying the third.

CHAPTER FLEVEN

FOOTWEAR

INTRODUCTION

IN the study of chiropody the knowledge of correct and incorrect footwear is an important factor

In the olden days shoes were merely a covering or means of protection from the rough roads thorns etc. The earliest shoe or sandal as it was called, is still to be seen in the British Museum and was used by the Egyptians. It was made of papyrus a thick sole giving the required protection. On this sole there was a leather loop through which went the great toe, and there was a thong which fastened over the instep to hold the sandal in position. This early type of footwear did not bring about foot ailments but with the progress of civilisation and *Dandee Fashion* the matter of correct footwear is no easy problem.

CHILDREN'S FOOTWEAR

The wearing of proper footwear should of course, begin from infancy. Even before a baby is put into shoes a most important point to note is that socks and more especially woollen gaiters with feet should be long enough. A great deal of harm can be done to an infant's foot from the wearing of woolies which have shrunk with washing. The child's foot is absolutely mobile and even the slightest pressure if continued over a period of time can cause a deformity such as hammer toe. Fig 1 shows a child of less than two years whose third fourth and fifth toes have become curled under due to the pressure of too short a sock.

A baby's shoe to all intents and purposes should only be worn for protection possessing just enough shape to designate it as a shoe. The material for the upper should be soft the sole also should be flexible to allow for the full play of all the muscles of the foot, especially the intrinsic muscles. Between

the ages of 2 and 5 the child should be put into something a little more substantial, and also bearing more relation to a proper shoe. There are various types of children's shoes highly advertised to-day as being the only correct type. Many of these have a prolonged heel on the inner border, its function being to assist the inner longitudinal arch, also, the shank of the shoe on the inner border is reinforced. To all outward appearance, the shoe appears to fit closely from the heel to the ball of the great toe, but with this stiffening in the shank the arch of the shoe does not fit the arch of a normal foot. There is a gap between the side of the foot and the shoe, where in some cases one can insert as many as three fingers. If a child continues to wear a shoe of this description, through time the scaphoid rotates inwards and slightly forwards and the foot over the tarsal region spreads to fill the empty space in the shoe. The child experiences no pain, probably, but is found to be walking badly, with a tendency to rock at the ankles, and the foot is placed down in an over-everted position.

Few children wear out their shoes, but they do grow out of them, and even the slightest pressure on the great toe from a shoe which is short in time causes a tendency to flexion and contraction of the hallucis longus tendon, which in later years may result in a bad hallux valgus.

A child's shoe should be just broad enough to allow the toes to assume a natural, uncompressed, weight-bearing position, it should be at least $\frac{3}{4}$ in. longer than the foot on weight-bearing. An important point to be noticed is that the great toe is not always the longest toe. Some people have the second toe as the longest, and in others it is found that the second and third are the longest. In cases of the latter it is most important to get the shoes fitted with a slightly broader front, also more square so as to allow the second and third toes to lie straight. If this is not watched these long toes may become hammer or overlap each other. In having the shoe broader across the toes, special care must be taken to ensure that it fits snugly at the heel and over the instep so as to prevent the foot slipping forward into the free space and thus still cramping the toes. The inner border of a child's shoe should be straight so as to allow the great toe

to lie in its correct alignment any narrowing of the vamp tends to deviate the great toe. A straight line should be able to be drawn from the heel to the ball of the foot in the shoe on the inner side.

It should not be necessary for a child's shoe to have the heel prolonged on the inner border, or to have the shank reinforced provided the foot is a normal one. It is much better for the arch of a child's foot to develop in the normal way when it will be much stronger than if it has been "supported" by shoes with prolonged heels, etc. The muscles and ligaments of the foot should be perfectly capable of doing their work by themselves and will develop a good strong arch when left alone to do so. Only when there are signs of weakness in the longitudinal arch should it be necessary to provide a support.

Not only in babyhood is it essential to avoid short stockings and socks but careful attention must be paid to children during school years. Before true ossification of the bony structures has taken place and even after, the muscles of a child's foot will readily yield to the conformation of short or too tightly pulled stockings. The common ingrown toenail may be the first indication of the pressure of a short stocking which if not attended to may lead to further foot troubles. The clearance of the stockings should allow for the forward plunge of the foot when walking—that is the toe of the stocking should be beyond the toes of the foot, so as to allow it to contract slightly with this movement in walking. Hosiery should be well rounded and not triangular if at all possible—the latter shape is very often the cause of the rotation of the fifth digit.

GENERAL FOOTWEAR

Fig 157 is a diagram showing the different parts of a shoe. It must be understood that people with abnormal feet cannot and should not, expect to be able to purchase ready-made shoes to fit them. For example it is ridiculous to assume that anyone suffering from an advanced degree of hallux valgus or from rigid flat foot can hope to be fitted with comfortable footwear from a shelf. Only by having

their footwear specially made for them by an orthopædic or surgical bootmaker can they hope to obtain any degree of comfort

In the ordinary manufactured shoes, women's shoes call for a little more criticism than men's. The main trouble with

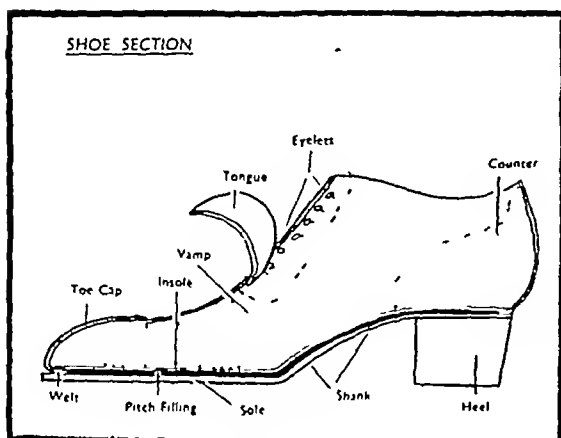


FIG 157

Showing the different parts of a shoe

the majority of women's shoes to-day is (1) the height of the heel accompanied by the small base; (2) the shortness of the arch, that is, from the heel to the ball of the first metatarsal.

The length of the vamp of the shoe varies, of course, with fashion, but for the most part it is short in style and too pointed.

It might be as well to study at this point what is thought to be a correctly fitting woman's shoe. One has to bear in mind that there are several different types of feet, and if shoe-fitting were to be perfect, then there would have to be lasts made and shoes manufactured for each type of foot.

A correctly fitting shoe is one which enables the foot to function normally, taking into consideration its length and width. The two main points of fit in a shoe are at the heel and ball of the foot. This part of the shoe, from the heel to the ball of the great toe at the first metatarsal head, is very important, it should fit snugly to the foot, and on weight-bearing there should be no gaps where a fold in the leather of the upper could be taken in (see Figs 158, 159, 160, 161). The second important point is that the toes must then have sufficient length and width to lie flat inside the shoe, the joint of the hallux resting at the widest part of the shoe; also, the shoe should be at least $\frac{1}{2}$ in. longer than the longest toe on weight-bearing. Once again careful fitting has to be made if the wearer has the second and third toes as the longest. Shoes which run to a narrow point must be avoided or trouble

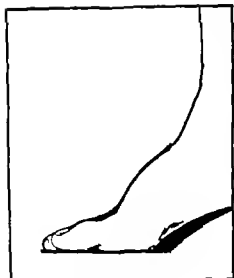


FIG 138

Shoe badly fitting in toes.

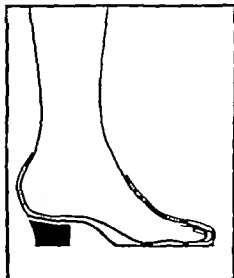


FIG 139

Shoe badly fitting in tread.

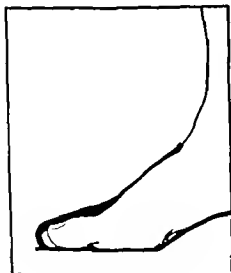


FIG 160

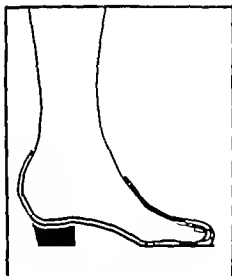
Shoe with correct fitting in toe
and tread

FIG 161

Shoe with correct heel seat and
tread

will arise on the apex of the third toe due to its position in the shoe.

The style of the shoe should be an ' Oxford ' if not a full lacing then a modified tie which gives a hold round the

instep This instep grip is most important, as it prevents the foot slipping forward in walking. The inner edge of the shoe should have as nearly straight a line on the vamp as is necessary, to allow the great toe to lie in its correct position. The height of the heel should be from $1\frac{1}{4}$ to $1\frac{1}{2}$ in. of the Cuban type, with a good solid base. The heel for preference should be made of leather, as this acts as a shock-absorber. The layers of leather give a little on pressure, whereas wooden heels are inclined to jar. The heel seat should be cupped to prevent the heel from rotating or slipping in the shoe (see Fig 161)

The shank of the shoe, which is so important, has been referred to previously in the heel-to-ball fitting, but it calls for more detail in regard to types of shanks. The aim of the shank is flexibility with support. It should produce no feeling of pressure but should give slightly with weight-bearing of the body and return to its plane with release of weight. Thus if a shoe is fitting correctly the muscles of the foot are acting normally and being kept in "tone," but if a foot is constricted in a shoe which is creating too much pressure round the instep, and if the shank is rigid, then the wearer is inclined to lift his or her foot in a solid block. In shoes which are fitted with steel or reinforced arches it will not be so easy to detect whether there is a gap behind the head of the first metatarsal, because with the use of the reinforcing the shanks retain a smooth contour on the outer surface.

Reinforced shanks may be made of steel, cork, or leather. The rigid shank is produced by the insertion of a strip of metal of varying kinds and thickness and weights into the sole of a shoe at the shank. In one make of shoe there is a steel shank which is rigid on weight-bearing and flexible when weight is released. Rigid shanks in the majority of cases are not to be desired. It is suggested that the steel is placed there to maintain the shape of the shoes and thus cover up a deficiency in the fitting of the shoe. It is possible nowadays to produce a shoe which has no reinforced arch and does fit the foot correctly. It is of no benefit to advise a person who is suffering from rigid flat foot to purchase shoes with a flexible arch. This arch after a few weeks' wear

would be broken down so that in cases such as this a shoe with a rigid or reinforced arch may be advised. It is better than wearing a shoe with a loose support in it.

Having now discussed what is considered a correct shoe let us consider the injuries done by ill fitting shoes and how they are brought about.

One American writer is said to have stated that the short vamp shoe is by far the greatest implement of torture that man has ever invented because it affects more people than all the barbarian tortures of the Middle Ages. The short vamp causes the toes to become crowded together causing faulty gait and posture and it impairs the circulation of the blood to the anterior portion of the foot. When this happens we have the start of corns, callosities, and ingrown nails. It leads to deformities such as hammer toe and hallux valgus, and is also a cause of metatarsalgia. The court shoe is the worst type of shoe with a short vamp and it is usually accompanied by a high heel. There is no fastening whereby a court shoe may be held in place so this is done by involuntarily curling the toes under thus giving a grip and holding the shoe on. Alternately the shoe is often fitted short, which compels the toes to be plantar flexed. Through continued wearing of court shoes the toes become cramped into a plantar flexed state and corns arise on the dorsum, and usually large callosities develop on the plantar surface especially over the head of the first metatarsal.

High heels come next in causing damage to the foot not only the height of the heel but the smallness of the base. The latter is more often the cause of foot trouble than the height. Standing in high heels is much more injurious to feet than walking in them. When a person is to be standing for any length of time then a low heel is best. It must be remembered that the body weight is carried through the body from the hip down the leg to the heel and so through the foot, the majority of the weight being carried on the calcaneum. Therefore when a woman wears a shoe with a heel of $2\frac{1}{2}$ in or more in height the majority of the weight is being carried on the heads of the metatarsals, giving rise to wrong body posture. By raising or tilting the posterior of the calcaneum (as is done in a high heel) undue strain is placed on the

ligaments and muscles concerned in maintaining the inner longitudinal arch, which through time causes the foot to become weak, leading possibly to pes planus. It is not wise to advise a patient who has been wearing high heels for some considerable time to go immediately into flat-heeled shoes; if this is done the patient will suffer with pain in the back of the legs owing to the stretching of the calf muscles

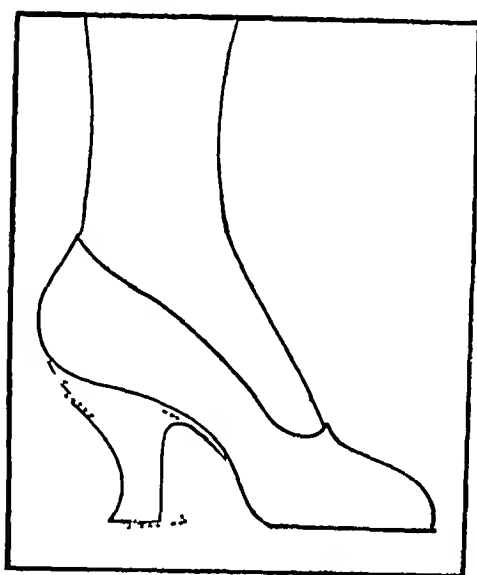


FIG 162

High heel with small tread. Note how the heel pulls away from the counter after wearing

which have become contracted owing to the continued wearing of high heels. To lower the heel gradually is the best policy.

The size of the base of the heel is important for giving correct balance. In heels of the peg type with a base the size of a sixpence, the weight-bearing part is much too small. This causes the wearer to walk in a stilted manner and also weakens the ankle. The base of the heel in a shoe of this type is too far forward, and in many cases after the shoe has been worn for some little time, the heel

starts to loosen away from the upper counter at the back (see Fig 162).

SPECIAL FOOTWEAR

Special footwear plays a useful part in the modern treatment of some foot disabilities. It is in some cases more beneficial than the various methods of padding and strapping, and the wearer is always having the correction while wearing the special shoe. No attempt will be made to enumerate or give details about all the shoe corrections which are used and advised, but it is thought that a few of the more common ones would be of use to the student.

Thomas Heel.—This is one of the most commonly used corrections. The breast of the heel is built on a curve, with

a slight extension of the inner edge out under the shank at a point somewhere under the first cuneiform navicular articulation. It is also slightly thicker on the inner side. This type of heel is combined with wedging on the inner side of the sole of the shoe, and is used as a correction for pes planus and weak foot. The thickness of the wedge varies according to the severity of the condition but it is usually about $\frac{1}{4}$ in thick. In extreme cases where over-correction is desired the Thomas heel may be prolonged to just behind the first metatarsophalangeal joint. This is only a temporary measure, and is used principally for children with congenital flat foot (see Fig 163)

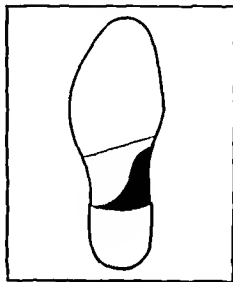


FIG 163

Thomas heel.

There are two other devices known to the surgical shoemaker for supporting the longitudinal arch. These are the 'turned up insole' and a 'long counter'. In the former the insole is blocked up on the last into the instep and is quite a suitable means of supporting a weakened long arch. In the latter the counter, or heel stiffener is extended on the inner side to finish just behind the head of the first metatarsal. This is a much stronger support than the turned up insole, but both methods may be used in conjunction with the Thomas heels and wedging or they may be used by themselves.

Metatarsal Bar—This is used in a great number of cases of metatarsalgia and pes cavus. The bar can be made in leather or uskide rubber. It is more satisfactory to be made of rubber as it is more lasting. It consists of a straight bar of leather or rubber about $\frac{1}{4}$ in wide and $\frac{3}{8}$ in thick placed under the outside of the sole diagonally behind the metatarsal heads. The result is that the weight is lifted from the heads and carried farther back. The bar can be thickened as desired according to the degree of deformity. In some cases the bar

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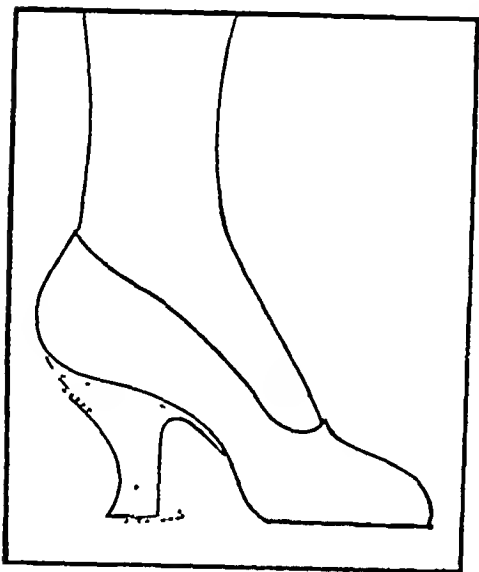


FIG 162

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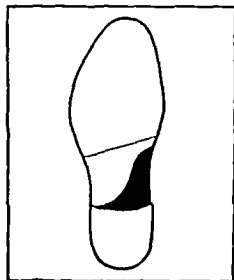


FIG 103

Thomas heel.

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is placed between the layers of the sole of the shoe in the process of making (see Figs 164, 165).

The metatarsal bar may also be used for hallux rigidus. Its function, in this case, is to act as a rocker and so immobilise the painful joint. Another method of dealing with this condition is to fit a *steel plate* between the insole and the sole of the shoe. This plate should extend from the heel of the

Showing metatarsal bar

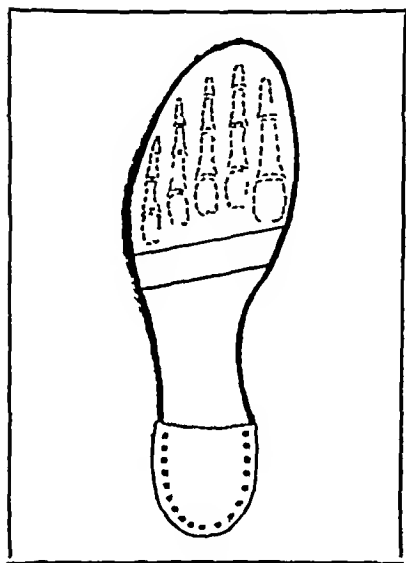


FIG 164

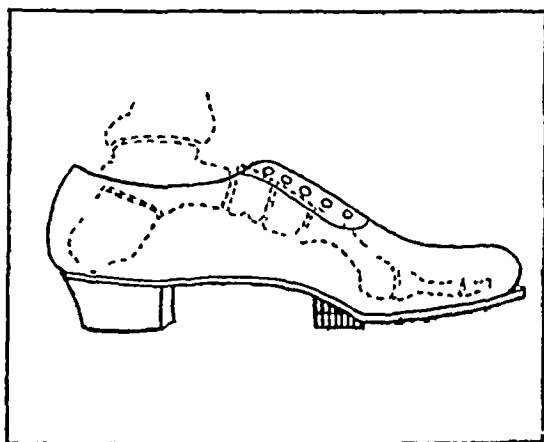


FIG 165

shoe forward to the interphalangeal joint of the great toe. It is intended as a splint for

the first metatarso-phalangeal joint, but must not in any way restrict movement at the interphalangeal joint of the hallux.

There is another painful condition which may be materially benefited by surgical footwear. This is *pes cavus*, or claw foot, which in advanced or severe stages is a deformity. In these cases it will be observed that weight-bearing is only being carried out by the heel and the ball of the foot, and there is flexion of the toes. Painful corns and callosities develop on the metatarsal heads and on the flexed joints of the toes. The aim of the shoemaker is to induce the foot to bear the weight of the body along the whole plantar surface, and it is done in the following way. Lasts are made which must correspond in every detail to the shape of the foot, and which must have the hollow arch and prominent metatarsal heads of the original. The hollow in the last is now

filled with cork, the cork extending from the heel forward to finish in the form of a wing metatarsal pad. This instep cork is sewn down with the insole, and is a decided help in securing the more even distribution of weight bearing so essential to this condition. This type of footwear, combined with chiropodial measures, will make the patient much more comfortable.

It is possible, sometimes, to alter ready made shoes to suit certain conditions. A Thomas heel may be built on to an ordinary shoe and the sole wedged, but such adjustments

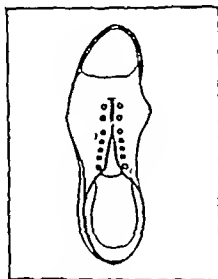


FIG. 166

Shoe adapted for hallux valgus.
Note that the additional eyelets
must extend well beyond the base
of the proximal phalanx.

should only be made to new shoes. It is impossible to secure good results when these alterations are made to a shoe which has been worn for some time and is twisted out of shape.

For a bursitic toe or inflamed hallux joint, a very useful device, known as a '*balloon patch*', may be applied to the shoe. A piece of the upper and lining of the shoe is removed over the site of the trouble and a loose patch of soft kid leather is fitted over the aperture. The patch must be sufficiently large to remove all pressure from the affected part, and will

be found most useful in the treatment of bursitis, where it is impossible for the patient to give up wearing shoes for a few days.

Where a bursitis occurs on the heel, a useful plan is to have a piece of the heel cut right out of the shoe in a U-shape and a piece of strong elastic sewn in over the aperture. this removes the irritation and allows the patient to walk more comfortably.

In cases of chronic hallux valgus great comfort can be obtained by wearing a shoe which is very wide across the great toe, but there is always the danger of the foot moving about too freely. To overcome this difficulty a slightly narrower shoe can be split down on to the vamp and two extra eyelets punched, which allow the lacing to come lower down and thus make the shoe wide enough yet firm, in its position (see Fig. 166)

CHAPTER TWELVE

DRUGS AND DRESSINGS

Drugs

IN making *choice* of a drug there are *three main points* which must be uppermost in the chiropodist's mind —

- 1 The action of the drug
- 2 The reaction of the body
- 3 The interaction of one drug and another

In other words, he must remember that while the drug is constant in its action the body (being alive) can choose what it will do with the drug for example, iodine has always a stimulant action but whilst one foot will tolerate the stimulating effect and give the intended result, another foot will *not* tolerate it but show all the signs of acute poisoning. This behaviour on the part of the patient is known as *idiosyncrasy*. Unfortunately, individual reactions can only be discovered after trial.

The interaction of two drugs however can and should be learned theoretically as for example, iodine and mercury may each be suitable for the same case, but applied together they constitute a poison. (Such details as this must be studied in a complete pharmacology handbook, as only a summary can be given here.)

In the actual use of drugs there are many points to remember —

- 1 Become thoroughly acquainted with a few drugs rather than have a superficial acquaintance with the whole pharmacopœia
- 2 Learn the difference between the strength and the amount of the drug used for example, one drop of 10 per cent. iodine is not the same as two drops of 5 per cent iodine.

3. Estimate how long the use of the drug should continue, in what conditions its use should be begun, and when it should terminate; for example, if a wound is not healing and the use of a stimulant is delayed, there may be dangerous ulceration, whilst if the wound is healing and a stimulant is applied, there may be resultant hypergranulation. Again, if a caustic has been applied to destroy some tissue condition, there must be an exact estimation when the eschar should be removed. If delayed too long the condition will be aggravated instead of reduced.

It is usual to *classify* drugs according to their *action*, and it will be noticed that some drugs have different actions according to the strength used

The **functions** required by drugs in chiropody are —

Disinfectant (germicidal and fungicidal) and antiseptic.

Analgesic.

Anhidrotic

Deodorant.

Astringent, hæmostatic, and styptic.

Absorbent.

Antiphlogistic.

Rubefacient and counter-irritant.

Healing and stimulant.

Caustic and escharotic.

Emollient.

Solvent.

Medicaments may also be classified according to type —

Lotion.

Paste.

Poultice

Liniment.

Emulsion.

Powder

Ointment

Cream.

Plaster

DISINFECTANTS AND ANTISEPTICS

DISINFECTANTS are strong enough to kill bacteria, but will also destroy the tissues. ANTISEPTICS retard the development of bacteria and allow healing of the tissues to take place. Disinfectants and antiseptics differ from one

another in strength. Disinfectant is one of the early words used rather loosely in connection with the idea of combating bacteria. Now the tendency is to confine its use to the absolute destruction of germin life. Germicide is a modern term.

In chiropody a disinfectant is used for disinfecting instruments. If used as a dressing or even as a cleansing agent on the skin it would destroy the tissues as well as the micro-organisms.

The usual disinfectants are 2½ per cent Iycol or 2½ per cent Dettol. These are used for instruments whilst an operation is in process. Pure Iycol may be used to disinfect instruments after use, they should be immersed in it for at least forty minutes.

ANTISEPTIC is the modern term which describes an agent which is strong enough to retard the development of bacteria and so give the body time to repair any tissue damage.

Antiseptics are used —

- 1 To render the skin surgically clean before chiropodial treatment, by means of a swab applied for a few minutes. For this purpose the usual agent is 1 per cent Dettol or 1 per cent Iycol or alcohol. Iodine is unsuitable as it discolours the skin, which is a disadvantage before a chiropodial operation.
- 2 As an after dressing. For this purpose there is a large variety of agents—*Iodine mixt.* *Acridlavine* (1 in 1 000) 2 per cent *Mercurochrome Compound Tincture Benzoin* (*Friars Balsam*) or *Boric Lotion*. The last mentioned is only mildly antiseptic, but it is very suitable for elderly patients.
- 3 As a dressing on open surfaces, such as fissures, broken chilblains, small cuts, broken blisters and in the cavity after a verruca has broken down. Suitable dressings are *Iodine Ointment* (5 to 10 per cent) *Acridlavine Emulsion* (1 in 1 500) *Silver Nitrate Ointment* (5 to 12½ per cent).

Antiseptics which are frequently used in chiropody are *Hydrogen Peroxide* (10 volumes) used for washing out cavities.

If there is a serous discharge there will be a slight reaction (effervescence). If there is a purely synovial discharge there will be no reaction. If there is pus present, the reaction will be very pronounced. For treating a diabetic ulcer, 5 volumes is strong enough; 10 volumes might destroy any feeble granulations.

Iodine is a powerful antiseptic and stimulant. The usual strengths are *mitis* (5 per cent. in alcohol) and *fortis* (10 per cent. in alcohol). This latter is also caustic. It is also used as an ointment (4 or 5 per cent. in glycerine and lard). *Liquor iodine mitis* is used as an antiseptic in ingrown nail cavity, and as a stimulant in early stages of chilblain.

Iodoform is a powder very suitable for dusting on ulcers as it is antiseptic, stimulant, and slightly anæsthetic. Combined with *bismuth and liquid paraffin* (bismuth and iodoform paste commonly known as *B.I.P.P.*) it is particularly useful, as the dressing does not need frequent renewing. A disadvantage is its strong, though not obnoxious, odour.

If iodine poisoning should follow, the first symptoms will probably be redness and watery blisters. A starch dressing should be applied, and if the symptoms do not subside in twenty-four hours the doctor should be consulted.

Phenol should never be used as a dressing on a finger or a toe. Even in a weak solution there is the possibility of carbolic gangrene resulting from the unsuspected presence of a globule of pure phenol floating in the solution.

Formaldehyde (40 per cent.) is known commercially as formalin. It is allowed to evaporate in a sealed container and so disinfect (1) dressings or (2) footwear which have been infected with *Tinea*. In a few cases it is liable to cause a contact dermatitis.

Potassium Permanganate is disinfectant, antiseptic, and deodorant. It stains badly, so its usefulness is limited, but it is otherwise ideal for bathing feet as it is non-irritant. The strength should be from about 1 in 250 to 1 in 1,000, or a pale pink colour in the foot-bath. It is used in cases of hyperhidrosis and bromidrosis.

Scarlet Red is a derivative of naphthol, and is a red powder soluble in oils and fats. It is antiseptic and stimulating. An ointment (1 to 8 per cent. in lard) is very useful in slow-

healing ulcers. A disadvantage is that it should be renewed night and morning.

Brilliant Green is produced from coal tar and is a strong antiseptic, but loses its power if pus is present.

Compound Tincture of Benzoin (Friars' Balsam) is not only antiseptic but is also a stimulant. For this reason it is useful as a dressing after removal of verrucae with suppuration. Its large alcohol content makes it sting badly when applied to a large area of broken skin. It is also of special use between the toes because of its astringent quality, but powder must always be dusted in when the Friars' Balsam has dried to prevent the toes sticking to each other. For early stage of chilblain it may be painted on after iodic mitis. It acts as a mechanical protection to the epidermis.

Friars' Balsam may also be painted on the surface before applying adhesive strapping. It is usually successful in preventing plaster rash as its protective covering prevents the plaster actually adhering to the skin. It is extremely rare to find a patient whose skin reacts unfavourably to Friars' Balsam but in these rare cases starch poultice or glycerine of starch has been found useful.

Boric Acid has the advantage of being a non-irritant antiseptic and so is useful for aged patients and young children. It is much used as boric lint or wool which is always coloured pink.

Alcohol is an excellent skin antiseptic because it dissolves fats and so can enter the sweat and sebaceous ducts. It quickly evaporates, which cools the skin and so less sweat is secreted owing to the vascular contraction. Thus alcohol is cooling, astringent, and anhidrotic.

Acryflavine is a coal tar product and is powerfully antiseptic, especially in the presence of pus. It is used as a solution (1 in 1 000 or 1 in 1 500). There is also an emulsion which is probably more generally used in chiropody for septic cavities though it does not keep very well.

Silver Nitrate (5 to 12½ per cent) as ointment in resin is antiseptic and stimulant as an after-dressing for ulcers.

Sulphonamide is one of the more modern antiseptics. It is of the greatest possible use in streptococcal infections and it does not damage the tissues. It can be had in many different

preparations—those most useful in chiropody are (1) sulphathiazole and (2) sulphacetamide. At the present time it can only be procured with a doctor's prescription.

(1) *Sulphathiazole* is a white powder. It requires moisture to be effective, and this is found in pus, so that it is specially to be recommended for cases of ingrown toe-nail with suppuration and slow-healing ulcers such as broken chilblains. On non-suppurating surfaces it may be sprinkled on and followed by lint with vaseline.

(2) *Sulphacetamide* is in ointment form and can be used in the acute stage of bursitis and similar conditions.

ANALGESICS

ANALGESICS by their action on the peripheral nerve endings cause a slight degree of local anæsthesia. They have a very limited action, and those most useful in chiropody are,—

Alcohol, produces anæsthesia by evaporation: it is rubefacient if rubbed in.

Benzocaine, 2 to 5 per cent in ointment.

Camphor, 1 part to 4 parts olive oil. It is slightly antiseptic.

Ichthyol (synonym *ichthammol*), 5 to 15 per cent ointment, 10 per cent in glycerine (useful in septic cavities).

Menthol, fused stick rubbed over parts, or spirit solution painted on.

Methyl Salicylate (oil of wintergreen), 1 part to 2 parts linolin. May be rubbed into rheumatic joints.

Ruta graveolens (oil of rue in a soapy spirit), lightly rubbed into an inflamed area or as a soak is very soothing.

Phenol, has an anæsthetic action because it kills the tissues with which it comes in contact. It can be used before enucleation of a neurovascular corn, but its effect should always be neutralised with alcohol after two minutes or less in a severe case.

ANHIDROTICS (ANIDROTICS)

ANHIDROTICS reduce the amount of perspiration and are used in cases of hyperidrosis and bromidrosis. The following are commonly used —

Alcohol cools the skin thus contracting the surface vessels so that perspiration is limited

Formaldehyde $\frac{1}{2}$ per cent in water as a foot bath

Potassium Permanganate $\frac{1}{10}$ to $\frac{1}{2}$ per cent in water as a foot bath that will produce a pale pink colour

Zinc Oxide 15 parts in lard 85 parts

Calamine (which is impure zinc carbonate) This is probably the best of the anhidrotics and it also relieves itch

DEODORANTS

DEODORANTS are used in hyperidrosis and bromidrosis to eliminate the offensive smell. They may be used in foot baths, as lotions, or as swabs in the footwear. Continual use of astringent and deodorant foot baths may injure the skin. It is better to bathe frequently in a fairly weak solution where the condition is not very bad. In extreme cases a daily application of a stronger lotion for three days may be recommended. *Formalin* (3 per cent) in water applied as a swab for five minutes or a strong solution of *permanganate of potash* may be used but the patient should be warned against continuing the treatment beyond three days.

ASTRINGENTS, HÆMOSTATICS AND STYPTICS

ASTRINGENTS diminish the size of vessels and so reduce the exudation from them.

HÆMOSTATICS AND STYPTICS stop bleeding. They include all astringents and also other drugs which assist the formation of clots. The most useful are —

Cold applied as ice or alcohol

Alum exsiccatum (with its derivative Kaolin or Fuller's Earth) dusted on to an open sore or a slight cut

Aluminium Acetate (Burow's solution 50 per cent) as a swab.

Silver Nitrate. 5 per cent. in water, painted on.

Iron Perchloride and *Iron Sulphate* are very effective, but stain linen badly

Hamamelis (witch hazel) tincture used as a swab.

Tannin (20 per cent) in glycerine. painted on.

Weak solutions of any acid. dilute vinegar, for example

ABSORBENTS

ABSORBENTS act mechanically and are used to dry up discharges. The most useful are .—

Absorbent Cotton Wool.

Amylum (starch).

Talc.

ANTIPHLOGISTICS

ANTIPHLOGISTICS are applications of either heat or cold for the reduction of inflammation. If they are applied in the early stages healing by resolution may take place, when otherwise there might be pus formation.

Heat may be applied as *hot fomentations*, *Kaolin poultice*, or *radiant heat lamps* or *infra-red lamps*.

Cold is applied by *compresses* and *evaporating dressings* (see Wet Dressings, p. 193).

COUNTER-IRRITANTS AND RUBEFACIENTS

COUNTER-IRRITANTS are used more generally in chiropody than antiphlogistics to reduce inflammation. Their action is to irritate the peripheral nerves, stimulate the circulation and relieve congestion. When superficial redness of the skin is produced they are classed as *rubefacients*. They produce dilatation of the drainage vessels, and thus they promote absorption of inflammatory products and effusions. They may be applied either directly over the seat of inflammation

(in nerve or vascular connection with it) or a little to one side of the affected area (when it is desired to promote the absorption of effusions). They have sometimes a more rapid and far-reaching effect than either heat or cold. They are most useful in the treatment of bursitis and painful joints, also in treating the early stages of chilblains. Care has to be taken that they are not used for too long otherwise vesication may result. When small superficial vesicles are produced containing plasma the drug is known as a *VESICANT*. If the vesicles contain leucocytes the drug is a *PUSTULANT*.

Methyl Salicylate, *Liquor iodi fortis*, *Camphor*, *Mustard*, *Scott's Dressing*, *Oil of Turpentine* may all be used. *Scott's dressing* which contains mercury must not be used in conjunction with iodine.

HEALING AGENTS AND STIMULANTS

HEALING AGENTS and *STIMULANTS* are used where it is desired to hasten the healing process in cases of ulcer, broken chilblain, bullæ, and small wounds. The following are useful —

Silver Nitrate (5 to 12½ per cent) as ointment in a resin base.

Compound Tincture of Benzoin (*Friars Balsam*) if there is not much raw surface.

Iodine mitis (5 per cent) in lanolin.

Iodine fortis (10 per cent in spirit) a small application immediately followed by *Balsam of Peru* painted on.

Red Lotion (zinc sulphate with tincture of lavender).

Scarlet Red Ointment (naphthol in lard).

EMOLLIENTS

EMOLLIENTS soften the skin and render it more elastic. In cases of anhidrosis and seed corns and in cracks and fissures, they are applied daily in small quantities. They are most effective when well rubbed into the skin. They consist of *Oils*, *Fats*, *Paraffin* and *Glycerine* (see Ointment Dressings p 104).

SOLVENTS

SOLVENTS are used in chiropody to (1) dissolve and remove fatty deposits on the surface of the foot, and also (2) to remove plasters and plaster marks. In the first case they are used to cleanse the skin before scalpel work. They are applied over a wide area and followed by an antiseptic. In the second case they are used to facilitate the removal of an adhesive dressing and to cleanse the skin before the application of a second adhesive. *Ether*, *Acetone*, *Alcohol*, and *Petroleum Spirit* are all used, ether is the most effective but is highly inflammable and should not be used near a naked light.

CAUSTICS AND ESCHAROTICS

CAUSTICS and ESCHAROTICS destroy living tissues to which they are applied. When the action produces a slough or eschar they are called escharotics.

They should be applied exactly to the area to be destroyed, and the surrounding area should be protected by a counter-agent.

They must be applied in *sufficient strength and quantity* to act quickly, otherwise they will act as stimulants.

They are used in cases of extensive callosities, soft corns, verrucae, hypergranulation, and onychophosis.

They can be used either as solutions or in ointment form. They may be either (a) acid or (b) alkali. The most commonly used in chiropody are —

(a) Acids—

Nitric Acid, very strong but easily controlled.

Phenol should be neutralised with alcohol after use.

Trichloroacetic Acid, moderately strong.

Monochloroacetic Acid, very penetrating.

Glaucal Acetic Acid, very strong.

Silver Nitrate, 50 per cent. and over. Safe in use, as it provides its own self-limiting eschar.

Salicylic Acid, 50 to 75 per cent., it exfoliates the skin freely.

$P = \frac{1}{2} \times 10 = 5$
 $L = 1 \times 1 = 1$

(b) Alloys—

Silver-Hg alloy

Platinum-Hg alloy

There is also *Card's Dioxide* which cements by freezing

DRESSINGS

Dressings can be classified as —

I Wet.

(1) Evaporating (which soon becomes dry)

(2) Non-evaporating (because of waterproof covering)

B Dry

C Ointment.

D Occlusive.

4 Wet Dressings may be applied either (a) hot or (b) cold

(a) *Heat* dilates the surface vessels inducing hyperæmia. This latter stimulates tissue activity and repair. If pus should be present it is encouraged to come to the surface by wet heat.

(b) *Cold* stimulates muscular contractions which depletes the superficial vessels, so relieving pain by reducing pressure on sensitive nerve endings. Cold lessens congestion where hyperæmia is not needed for tissue repair. Thus cold wet dressings are more useful during the earlier stages of inflammation than later on.

Advantages of Wet Dressing—It is stimulating healing soothing helps in evacuation of pus

Disadvantages of Wet Dressing—If it is allowed to dry it may become irritant. If it is kept wet for too long the skin becomes sodden and devitalised. When a wet dressing is worn inside a shoe there is heat, moisture absence of ventilation—the ideal conditions to cultivate bacterium

Wet Dressing consists usually of several layers of lint wrung out of sterile water or any drug solution which may be desired, such as *Borax* or *Buroz's Solution*. It may be repeatedly drenched with fresh quantities of the water or covered in with oiled silk or cellophane.

Lotion.—The drug solution is a lotion. It may be (a) aqueous, or (b) spirit. Spirit solution is more evaporating than aqueous, hence more soothing. It is useful in subacute inflammation, and should not be covered with oiled silk.

B. Dry Dressings.

The advantages of dry dressings are : (1) They keep the skin healthily dry. (2) They absorb pus from a discharging surface.

The disadvantages of dry dressings are : (1) They are apt to stick to a wound and cause hemorrhage and breakdown of new granulations on removal. (2) When pus is present they are apt to become hard and irritant.

Dry dressings consist usually of *sterile lint* or *gauze*, which may be impregnated with an antiseptic such as *Boric Acid*, *Acridine*, *Iodoform*, or *Thymol*. They should be kept in air-tight sterile containers.

Dry dressings might also consist of powder—*Boric Powder*, *Talcum*, and *Fuller's Earth* are commonly used. They are cooling and useful for hyperdrosis and bromdrosis, but are apt to form an irritating crust when pus is present.

C. Ointment Dressings.

The advantages of ointment dressings are : (1) They are soothing and cooling. (2) They prevent the lint sticking to a wound. (3) They can be combined with any required medicaments such as iodine, silver nitrate, salicylic, or ichthyol. (4) The drug is kept longer in active contact with the skin.

The disadvantages of ointment dressings are : (1) The oiliness prevents the lint from absorbing any pus. (2) If they are used for too long a period the skin may become softened and devitalised.

Ointment dressings may consist of any kind of grease : (1) *Animal*, (2) *vegetable*, (3) *mineral*. Animal fats are most

easily absorbed and are used when *penetration* is desired. The most frequently used are Sheep, *lanolin*, pig lard, goose, *anserine*, whale *spermaceti*, cod cod liver oil, bee, *beeswax*. Vegetable fats *soften the skin*. Those most frequently used are *olive oil*, *almond oil* and *resin*. Mineral fats are used when *surface lubrication* is required and not penetration. *Vaseline* is the one in general use. Ointments are either rubbed into the skin or applied on gauze or lint.

PASTES

PASTES are ointments to which some powder has been added—*zinc* or *starch* usually. They are more soothing than ointment and the powder in them can absorb moisture, so they are useful where there is a slight discharge.

Magnesium Sulphate Paste (Epsom Salts) is a dressing which can be applied to hyperkeratosis. It is also useful as an intermediate dressing for verruca when treatment has to be changed from one caustic to another. It is to be recommended also for dermatitis and plaster rash.

CREAMS

CREAMS are softer than paste as they have a smaller quantity of solids incorporated with the fats. *Witch hazel cream* and *zinc cream* are commonly used in chiropody.

EMULSIONS

EMULSIONS are preparations in which an insoluble substance is suspended in a liquid. They generally have two constituent fats and water. They cool the parts by the evaporation of the water. *Acridiflavine* is the one most commonly used in chiropody.

D Occlusive Dressings

The advantages of an occlusive dressing are (1) Absolute security from further infection. (2) Additional stimulation from induced heat.

The disadvantages of an occlusive dressing are - (1) The pus is prevented from escaping from the parts. (2) Development of bacteria is assisted by heat and moisture.

An occlusive dressing usually consists of *collodion* painted on thickly or an *adhesive plaster*.

PLASTERS

PLASTERS consist of medicaments incorporated with a base of resin, soap, diachylon or rubber, and spread on skin, felt, sponge rubber, or some fabric such as cotton or stockinet. Zinc oxide in rubber is most commonly used by chiropodists, though soap plaster is a useful alternative where the patient has an idiosyncrasy to rubber. Salicylic and pyrogallie are used in soap plaster to exfoliate the skin in seed corns. Soap plaster on buckskin is often used for protective dressing on calloused patches. Diachylon plaster on chamois skin can make almost ideal protective pads.

LINIMENTS

LINIMENTS are intended for application with friction. They are prepared in an oily or soapy medium. They have a mild action in cases of chronic inflammation.

POULTICES

POULTICES are semi-liquid masses which are used to supply heat and moisture or to act as a local stimulant. They commonly consist of starch poultice, linseed poultice, or Kaolin poultice.

FOOT-BATHS

FOOT-BATHS may be - (1) hot, (2) tepid, (3) contrast. They may all be medicated or not.

(1) Hot foot-baths are useful in reducing inflammation, and in suspected infection from a dirty wound. Three per cent. *salicylic* may be used or 1 per cent. *Dettol* or *Lysol*. The water should be kept as hot as is comfortable for at least

fifteen minutes, and the foot immersed at least to above the ankle

(2) Tepid foot baths are best in cases of hyperidrosis or broadrosia. They should be $\frac{1}{2}$ per cent. *formalin* or 3 per cent. *salicylie* or *potassium permanganate* to a pale pink colour

(3) Contrast baths are useful for stimulating the peripheral circulation in cases of chilblains. They are useful in cases of weak foot in adolescents. They are *contraindicated* in sclerotic cases. Their use is described on pp 132-133

Medicated Soaps are of no advantage in foot baths. The soap is in contact with the skin only a very short time and the strength varies with the dilution. It is better to add the medicaments to the water to the desired strength

INDIAN FOOT CARE

Travellers in the East have frequently brought home stories of marvellous 'suction operations' by which various weird 'growths' have been extracted from their toes

Fig 107 shows what was removed from the toe of one patient by means of a needle prick and a suction tube' as she explained. The plate shows the actual size. The white spot in the centre is a pin head. The operator had returned



Fig 107

Result of suction extraction
so-called 'Treatment given by
Indian methods'. Actual size of
"object"

from India where he had learned the art from a grateful Indian whom he had befriended. Fortunately the patient recognised the throbbing in the toe next day as a danger sign and called in a medical practitioner who reported that he had to treat an inflamed toe. A fortnight later she entrusted the curious specimen — of which she was inordinately proud — to the author in order to have it analysed.

The laboratory report stated that it consisted of 'red blood cells and leucocytes' no other structure of a tissue type either vegetable or animal

GLOSSARY

- Abducted forefoot :** The forefoot turned outward at midtarsal joint.
- Abrasion :** A circumscribed removal of epidermis or mucous membrane
- Abscess :** A circumscribed cavity containing pus
- Acanthoma :** A localised excessive growth of the prickle-cell layer of the skin
- Achillobursitis anterior :** Inflammation of bursa lying between the tendo Achillis and the calcaneum (*Synonyms*—Achillodynia Albert's disease retrocalcaneal bursitis)
- Achillobursitis posterior :** Inflammation of superficial bursa lying between tendo Achillis and the skin
- Achillodynia .** *See* Achillobursitis anterior
- Acquired :** Refers to disease which is contracted after birth (*Antonym*—congenital)
- Acrocyanosis :** Blueness of the extremities due to vasomotor disturbance
- Acromegaly :** A chronic disease in which there occurs enlargement of the bones in the head, hands and feet
- Active movements :** Movements produced by the voluntary use of the muscles concerned (*See* Passive)
- Acute :** Refers to disease with a rapid onset short sharp duration and noticeable termination Not chronic
- Adducted forefoot .** The forefoot turned inward at midtarsal joint
- Adipose :** Fatty
- Adjacent :** Alongside
- Agent :** Anything which produces an effect upon the organism
- Align :** Bring into position with relation to other parts
- Anæmia :** Deficiency of red blood cells
- Anæsthesia :** Absence of sensation
- Analgesia :** Insensibility to pain
- Analgesic .** A remedy which tends to relieve pain
- Aneurysm :** A circumscribed dilatation of an artery due to disease
- Anidrosis (Anhidrosis) :** Deficiency of sweat
- Anidrotic (Anhidrotic) .** Agent which tends to reduce sweat
- Ankylosis :** Fixation of a joint
- Anterior .** In front
- Anterior poliomyelitis .** An acute disease of the motor root cells of the spinal cord with accompanying paralysis of muscles of one or more limbs
- Antero-posterior :** From front to back
- Antiphlogistic :** Agent which counteracts inflammation
- Antisepsis :** Retardation of micro-organism development
- Antiseptic :** An agent which produces antisepsis
- Aponecrosis :** Muscle sheath
- Apophysitis .** Inflammation of the epiphysis of a bone
- Arida (femur singular) .** Dry

- Arteriosclerosis** Hardening of the arteries
- Arthritis** Inflammation of a joint
- Arthritis deformans** A chronic joint disease causing deformity
- Arthrodesis** Surgical fixation of a joint
- Articular** Related to a joint
- Articulation** A joint consisting of two bones with the attached tendons and ligaments
- Asepsis** Absence of pathogenic micro organisms
- Asphyxia (local)** Local congestion of a part leading to accumulation of metabolic waste products and deprivation of oxygen
- Asthenia** Loss of strength
- Astringent** An agent which causes contraction of skin tissues thus tending to dry up discharges
- Asymmetry** Loss of symmetry *i.e.* loss of the resemblance of corresponding parts of body to each other
- Ataxia** Loss of muscular co-ordination
- Atheroma** Fatty degeneration of the walls of arteries in arteriosclerosis
- Athletes foot** Dermophytosis akin to ringworm occurring in the foot
- Atony** Lack of tone or of tension
- Atrophy** Wasting of tissue
- Auto-infection** Infection by some virus originating in the body itself
- Autonomic** The autonomic nervous system comprises sympathetic and parasympathetic nerves and supplies the viscera glands and involuntary muscles including arterioles
- Bacillus** A rod shaped bacterium (*Plural*—bacilli)
- Bacterium** A unicellular micro-organism (*Plural*—bacteria)
- Benign** Not endangering health (*Antonym*—malignant.)
- Bilateral** Relating to both sides
- Blister** Bulla Circumscribed elevation of the epidermis containing fluid
- Bodies of Vesalius** Rare supernumerary bones in tendo Achillis
- Brodie's abscess** Chronic abscess of bone
- Bromidrosis (Bromhidrosis)** Excessive foul smelling perspiration
- Buerger's disease** Thrombo-angitis obliterans
- Bunion** Inflamed bursa over an exostosis associated with hallux valgus
- Bursa** A closed sac containing synovial fluid or serum where tendons work over joints or between bones
- Bursitis** Inflammation of a bursa
- Calcaneal spur** An exostosis found at the weight bearing inner tuberosity of the calcaneum
- Calcaneo-bursitis** Inflammation of the inferior calcaneal bursa
- Calcareous** Chalky
- Calcified** Hardened by the deposition of lime salts
- Callositas callosity** Thickened epidermis

- Callus** : The new bony development which takes place round the fractured ends of a bone. In chiropody it sometimes refers to thickened epidermis.
- Calor** : Heat.
- Capillary** : One of the minute blood vessels which distributes the blood supply from the arteries and returns it to the veins.
- Capsule** : A membranous structure which encloses any part of the body e.g., a joint capsule.
- Carbon dioxide pencil** : Solidified carbon dioxide in pencil form used for destruction of verruca.
- Caries** : Destruction of bone tissue corresponding to ulceration of soft tissues.
- Cartilage** . A gristle substance. In the foot there are two varieties . (1) temporary cartilage occurs in very early life and later ossifies , (2) permanent cartilage is articular cartilage and covers the ends of the bones in a joint.
- Caustic** : Agent which destroys organic tissue.
- Cavus** : Hollow or high-arched.
- Cellulitis** : Inflammation of the cellular tissue.
- Cerebrum** . The brain (*Adjective*—cerebral)
- Cerebrospinal** : Connected with the brain and the spinal cord.
- Chilblain** : An inflammation of the skin following undue exposure to excessive cold and damp.
- Chimaton, mild** : Chilblain.
- Chiropody** . The art and practice of scientific foot care.
- Chromidrosis** . A disease of the sweat glands in which the perspiration is coloured.
- Chronic** . Of long duration. Refers to a disease which is gradual in its progress and which persists over a long time.
- Cicatrix** . A scar (*Adjective*—cicatricial)
- Circumduction** : Movement of a limb in a circular direction.
- Circumscribed** : Definitely limited in area (*Antonym*—diffuse)
- Claudication** : Limping.
- Claw-foot** . A foot with abnormally high arch and clawed-in position of toes—due to wasting disease of muscles.
- Clonic** : Marked by alternate contraction and relaxation of muscle.
- Clot** . Coagulated blood.
- Club-foot** . The pathological fixation of a foot in one position (*Synonym*—Talipes)
- Coagulation** . Clotting— the process of changing from the fluid state to a coherent jelly-like mass.
- Coagulation necrosis** . Death of tissue, due to coagulation.
- Cocoon dressing** . This dressing consists of several layers of gauze or cotton wool covered in with collodion.
- Comminuted fracture** . Broken into a number of pieces.
- Compound fracture** : A fracture with a wound communicating with the surface of the body.
- Concave** . An inwardly curved surface (*Antonym*—convex)
- Concomitant** . Occurring at the same time and place.

- Congenital** Existing at birth (*Antonym*—acquired)
- Congestion** A state in which the tissues have unnaturally widely dilated blood vessels leading to relative stasis of the blood
- Constitution** Bodily strength or mental or physical temperament
- Constitutional disease** Disease related to the constitution as a whole (*Synonym*—systemic *Antonym*—local)
- Contracted** Shortened
- Contraindicated** Referring to a remedy whose use is not indicated but rather forbidden by some symptom
- Contused** Bruised
- Convex** A surface which curves outwardly (*Antonym*—concave)
- Co-ordination** The orderly working together of different muscles or groups of muscles
- Corn** A localised thickening of the epidermis occurring over some abnormal bony prominence and due to excessive friction
- Counter of shoe** The leather stiffening of a shoe round the back of the heel
- Counter irritation** Inflammation of the skin produced artificially for the purpose of reducing internal inflammation
- Cramp** A painful muscular contraction (*Synonym*—spasm)
- Crepitus** The gritting or creaking sensation produced by movement of a fractured bone or of an arthritic joint or of an inflamed tendon sheath
- Cutis** The skin (*Adjective*—cutaneous)
- Cyanosis** Bluish discoloration of the skin due to lack of oxygen in the blood may be owing to circulatory deficiency
- Cyst** An abnormal sac with fluid or gelatinous content
- Dactyl** A finger or a toe
- Degeneration** Deterioration falling from a higher to a lower grade
- Dehydrating** Being deprived of water
- Delluesce** To become liquid by absorbing water from the atmosphere
- Demarcation** Setting a definite boundary
- Denuded** Completely uncovered or bare
- Deodorant** Agent which destroys offensive odour
- Dermatitis** Inflammation of the skin
- Dermatology** The branch of medicine which has to do with the skin and its diseases
- Dermis** The true skin or the quirk
- Dermatophytosis** Skin disease due to fungus infection
- Desiccant** A drying agent
- Desquamate** To shed the skin in flakes (*Synonym*—exfoliate)
- Devitalised** Deprived of energy
- Diabetes mellitus** A disease in which there is an excessive discharge of urine containing sugar
- Diachylon** A sticking plaster with lead base
- Diagnosis** Recognition of a disease scientifically by considering the signs and symptoms

- Diapedesis:** The normal passage of blood cells through the unruptured walls of the capillaries.
- Diathermy:** Heat penetration.
- Diathesis:** A constitutional predisposition to any disease or group of diseases.
- Diffuse:** Widespread (*Antonym*—circumscribed)
- Digit:** A finger or toe.
- Dilatation:** Enlargement or expansion
- Diplegia:** Paralysis of all the extremities
- Direct cautery:** Actual fire, or heat from red-hot metal applied to a part to destroy it.
- Disease.** An interruption of the correct functioning of any part of the body
- Disinfectant:** Agent capable of destroying micro-organisms and their spores
- Disintegration:** Breaking up into component parts by natural or artificial agency
- Dislocation:** Displacement of the proper continuity of the bones in a joint.
- Distal:** An adjective referring to a part of the body which is further from the heart than another part (*Antonym*—proximal)
- Distension:** A state of being stretched.
- Dorsalis pedis pulse** The impulse felt in the dorsalis pedis artery
- Dorsiflexion:** Flexion towards the dorsum.
- Dorsum:** The back or posterior surface of any body. The upper surface of the foot. (*Adjective*—dorsal.)
- Dorsum of foot:** The upper surface of the foot
- Drop foot:** Talipes equinus
- Duct:** A channel through which there is conveyed some fluid—as the secretion of a gland or the discharge from an abscess
- Durum** (neuter singular) Hard (*Neuter plural*—dura)
- Ecchymosis:** A purple discoloration of the skin due to extravasation of blood
- Ectoderm:** The outer layer of developing embryonic tissue
- Eczema** A skin disease with redness, itch, a dema, and exudation
- Effusion:** Accumulation of tissue fluids in a cavity, may be serous or haemorrhagic
- Elephantiasis:** Extreme hypertrophy of the skin and subcutaneous tissues
- Embolism:** Obstruction of a vessel by an embolus (*i.e.* detached clot) or other matter conveyed in the blood-stream
- Emollient:** Softening, therefore generally soothing to the skin.
- Encapsulated.** Enclosed in a capsule or in a sheath
- Encysted:** Within an enclosed membrane
- Endoderm:** The inner layer of developing embryonic tissue.
- Enucleate:** To remove entirely the nucleus of a corn
- Epidermis:** Outer layer of the skin.
- Epithelioma** A cancerous growth of epithelium

- Epithellium** Term applied to cells which form epidermis and line all canals communicating with exterior
- Eponychium** Cuticle of the nail
- Equinus** One group of talipes in which the patient walks on toes and anterior part of foot heel cannot reach the ground
- Eradicated** Rooted out
- Erosion** Eating away
- Erythema** Redness of the skin as from sunburn
- Erythema pernio** Chilblain
- Erythrocyanosis** Circulatory disturbance chiefly affecting women when there is reddish purple blotching of lower third of leg
- Erythromelalgia** Painful redness
- Eschar** A slough of skin consequent on a burn
- Escharotic** An agent which canterises and produces a slough
- Ethics** The principles of correct behaviour
- Etiology** The study of the causes of a disease
- Etiquette (professional)** The code of ethics as applied to the relationship existing between and among practitioners patients, and the public
- Eversion** Turning outwards (*Antonym*—inversion)
- Exacerbate** To become worse
- Exfoliation** Scaling off of dead tissue
- Exostosis** A bony tumour
- Extension** Straightening out
- Fascia** Fibrous membranes
- Fasciitis** Inflammation of fascia
- Fibrositis** Inflammation of fibrous tissue
- Fissure** A split or a crack
- Flaccid** Weak or lax
- Flexion** State of being bent
- Focus** The principal seat of a disease
- Fomentation** Application of absorbent material saturated with hot fluid
- Foreign body** A substance in a wound which is extraneous to it
- Fracture** A breaking especially of bone
- Friction** Rubbing
- Fungus** Microscopic vegetable parasite
- Fungicide** An agent which can kill fungus
- Ganglion** An encysted tumour in tendon or aponeurosis also a nerve relay station
- Gangrene** Death of a part of the body from malnutrition
- Germicide** An agent which is destructive to disease germs
- Hæmorrhage** Discharge of blood from the vessels
- Hallux** The great toe
- Hallux flexus** A condition in which the hallux is flexed dorsally at the metatarso-phalangeal joint and plantar flexed at the interphalangeal joint.

- Hallux rigidus:** A condition in which the first metatarso-phalangeal joint has stiffened
- Hallux valgus:** A condition in which the great toe deviates outwards from the midline of the body
- Hallux varus:** A condition in which the great toe deviates inwards towards the midline of the body.
- Hammer toe:** A condition where the proximal phalanx is dorsiflexed, the medial phalanx is plantar-flexed, and the distal phalanx is also plantar-flexed
- Heloma** (neuter singular, *phyal*—heloniata): A corn (derived from the Greek *helos*) American term
- Hemiplegia:** Paralysis of one side of body
- Hereditary.** Transmitted from parents
- Histology:** Minute anatomy of the tissues
- Humida** (feminine singular): Moist
- Hyperæmia:** Excess of blood in the capillaries
- Hypercholesterolæmia** Excess of cholesterol in blood
- Hypergranulation:** Excess of granulation tissue; or proud flesh.
- Hyperidrosis (Hyperhidrosis).** Excessive sweating
- Hyperkeratosis:** Hypertrophy of the horny layer of the skin
- Hypertrophy:** Overgrowth of a tissue
- Idiosyncrasy:** An individual abnormal susceptibility to certain agents
- Immobility.** Fixed or incapable of movement
- Incision.** A cut
- Infectious** Communicable from one person to another
- Inflammation:** The reaction to any injury when there is pain, redness, heat, swelling and disordered function
- Inherited.** Obtained by hereditary transmission
- Injury.** Damage, a wound or lesion from accident or violence
- Intermittent claudication.** A lameness occurring at intervals due to arteriosclerosis
- Involution:** A rolling inwards. In chiropody it refers to the curving in of the lateral or medial edge of a nail. In medicine it refers to the retrogression to normal of certain tissues after fulfilling a special purpose
- Ischæmia:** Local anaemia
- Joint:** An articulation
- Keratin** The basis of horny tissues such as nails, hair, etc
- Kohler's disease:** Osteochondritis affecting the second or third metatarsal or the navicular
- Koilonychia.** A spoon-shaped nail
- Lancinating:** Piercing, darting (used with reference to pain)
- Lateral:** Outer aspect from midline of body
- Leucocytes.** White corpuscles of the blood
- Lipoma.** Tumour of fatty tissue
- Local** Limited in area

- Locomotor ataxia** Tubes dorsalis, chief sign of which may be muscular inco-ordination in walking.
- Lumen** The channel inside a blood vessel
- Lupus vulgaris** Chronic tubercular skin disease
- Maceration** A soft moist mass
- Macrophage** Large phagocyte
- Malformation** Abnormality of form
- Malignant** Cancerous
- Malleolus** The ankle bone
- Mallet toe** A condition in which there is plantar flexion at the second interphalangeal joint of the toe
- March fracture** Fracture of metatarsal usually second or third
- Matrix** The substance or mould in which a tissue is formed e.g. proximal end of the nail bed
- Medial** Towards the middle line
- Melanoma** A tumour with dark pigment generally cancerous
- Mesoblastic** Derived from the middle layer of primitive developing tissue
- Mesoderm** The middle layer of developing embryonic tissue
- Metatarsalgia** Pain in the metatarsal area
- Metatarsus primus varus** A condition in which the first metatarsal deviates towards the medial side
- Microbe** A small organism bacterium
- Micro-organism** A microscopic being of the animal kingdom
- Microphage** A small phagocyte
- Mole** A small brown spot in the skin
- Molle** (neuter singular) Soft (*Neuter plural*—mollia)
- Mycosis** A skin disease due to fungus infection
- Myxœdema** A nutritional disorder in which there is deposition of waxy fat in the subcutaneous tissues
- Nail** A horny structure derived from epithelium and covering the phalangeal extremities
- Necrosis** Death of tissue
- Neoplasm** New growth used with reference to tumours
- Neuralgia** Nerve pain
- Neuritis** Inflammation of nerve
- Neuroma** Nerve tumour
- Neuro-vascular** Involving nerves and blood vessels
- Nucleus** Kernel or dense concentration in a cell
- Oblique** Slanting
- Edema** Swelling due to serous effusion into subcutaneous tissue
- Onychatrophia** Atrophy of nail
- Onychauxis** Hypertrophy of nail
- Onychia** Inflammation of the matrix of a nail
- Onychocryptosis** Ingrown toe nail
- Onychogryposis** Hypertrophy of nail with deformity
- Onychomycosis** A fungoid condition of nail
- Onychophosis** Calloused nail groove

- Onychorrhhexis** : Brittle nail
- Osteoarthritis** : Degeneration of the articular cartilages of a joint, associated with trauma or old age.
- Osteochondritis** : Inflammation involving bone and cartilage of joint
- Osteomyelitis** : Inflammation of marrow of bone
- Osteoma** : Benign tumour of bone
- Osteophyte** . A bony outgrowth
- Panniculitis** . Inflammation of fibres which attach skin to deeper layers.
- Papilla** : A small eminence
- Papilloma** : A benign epithelial tumour
- Paralysis** : A loss of muscular power
- Parasite** : An organism living on another
- Paronychia** : Inflammation of nail sulcus
- Passive movements** : Movements produced by manipulation (See Active)
- Pedis** : Pertaining to the foot
- Periostitis** . Inflammation of periosteum
- Periosteum** . Membrane surrounding bone.
- Periphery** : Circumference
- Pernicious** : Dangerous
- Pes cavus** : Claw foot
- Pes planus** . Flat foot
- Plantar** . Relating to sole of foot
- Plantar flexion** : Flexion of foot downwards
- Polydactylism** . Condition in which there are too many toes
- Posterior** : Towards the back . behind
- Prognosis** : Predicting the course of disease
- Proximal** : An adjective referring to a part of the body which is nearer the heart than another part (*Antonym* - distal)
- Pus** : Yellowish fluid from inflammation containing dead leucocytes, bacteria and tissue fluids
- Pyogenic** : Producing pus
- Raynaud's disease** : A disturbance of the vasomotor system in which there is an abnormal sensitivity to cold
- Referred pain** : Pain felt at a distance from its cause.
- Renal** : Pertaining to kidneys
- Rheumatism** : A constitutional disease with pain in muscles and joints
- Rheumatoid arthritis** : Inflammation of the synovial membrane of a joint, leading to swelling of the joint and to spasm of the muscles and ligaments surrounding it
- Rickets** : A disease of childhood in which there are changes in the bones, due to malabsorption of calcium
- Rodent ulcer** : A malignant ulcer which gradually eats away epidermis and soft tissues
- Rubefacient** . Agent producing redness of skin
- Sac** : Bag or pouch
- Sepsis** : Pertaining to pus

- Septicæmia** Blood poisoning
Sequestrum A fragment of dead bone
Serous Pertaining to serum
Serum A fluid constituent of blood
Sheath Covering substance
Sinus A canal or cavity with a narrow entrance
Slough Separated necrosed skin
Solvent Agent which dissolves substances
Sore Ulcerated or inflamed area—tender
Spasm Involuntary muscular contraction which may be sudden and of short duration or long continued
Spastic Characterised by spasm
Spastic diplegia Deformity with scissor gait
Spina bifida Congenital cleft of vertebral column with meningeal protrusion
Sprain A sudden strain tearing muscle fibres
Squamous Scaly
Sterile Free from micro-organismal contamination
Strain Produced by overwork or prolonged over use of muscle or tendon
Subluxated Partially dislocated
Subungual Under the nail
Sympathectomy Excision of sympathetic nerves (*See* Autonomic)
Syndactylism Fingers or toes joined together—too few of them apparently
Synovitis Inflammation of synovial membrane of joint or sheath of tendon
Syphilis Venereal disease
Systemic Pertaining to a system

Tabs dorsalis Degeneration of posterior and lateral columns of spinal cord due to syphilis
Talipes Foot deformity from muscular contraction
Talipes calcaneus Claw foot when patient walks on heel alone—toes cannot reach ground
Talipes equinus When patient walks on toes and anterior part of foot—heel cannot reach ground
Talipes valgus When foot is everted—walks on inner border
Talipes varus When foot is inverted—walks on outer border
Telangiectasis Permanent dilatation of groups of capillaries
Tenosynovitis Inflammation of a tendon sheath
Thrombo-angitis obliterans Inflammatory disease of blood vessels affecting the artery walls and leading to progressive diminution of their lumen
Thrombus Blood clot obstructing vessel at point of formation
Tinea Ringworm a skin disease caused by parasitic fungi
Trauma Injury
Tuberculosis Infectious degenerative disease with formation of tubercles (particular form of nodules)

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